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Horticultural Crops Research Branch

THE NATIONAL POTATO-BREEDING PROGRAM,
1953

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By
F. J. Stevenson and Others,
Section of Vegetable Crops,
and
State Cooperators

(Twenty-fourth Annual Report to Cooperators)
Plant Industry Station
Beltsville, Md.

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NATIONAL POTATO-BREEDING PROGRAM, 1953

By F. J. Stevenson

Yields

In 1953 the yields in the tests in Maine were not exceptionally high. In a group of medium and early maturing varieties Chippewa produced the highest yield --481 bushels U.S. No. 1 potatoes per acre. Keswick, a Canadian variety, resistant to the common races of late blight, was second, with 430 bushels per acre. B 922-6, an early variety resistant to all the races of late blight found so far in the United States, yielded 331 bushels per acre. (See P. I. table 7).

Among the late varieties Kennebec significantly outyielded all the others in the test, with a yield of 572 bushels of U.S. No 1's per acre (P.I. table 8).

In variety trials conducted at 4 locations in Maine 2 red-tuber varieties, Pontiac and B 2368-4, topped the list for an average of all 4 tests, with 535 and 519 bushels per acre, respectively. Teton, Kennebec, B 606-67, Green Mountain, and Ontario all yielded more than 500 bushels per acre. Russet Burbank yielded 422.

Quality

Dry matter is not the only factor involved in potato cooking quality but it is one of the most important. Often the environment under which the potatoes are grown is more important in producing tubers with a high percentage of solids than the variety. This can be seen repeatedly in the reports from the various States. An interesting example of this is seen in the Maine report (Nielsen table 4). The Green Mountain produced tubers containing 17.4% solids in one place and 21.6% in another. On the average for 4 locations 10 varieties had a dry-matter content of 19.7% (sp. gr. 1.080) or better. Five varieties were higher than Russet Burbank in dry-matter content and Kennebec, Cherokee, and Keswick were the same. Katahdin averaged 19.1% solids or 0.7% less than Russet Burbank, a very small difference.

Many factors are involved in the development of solids in potatoes such as day and night temperatures, available moisture, fertilizer practices, application of fungicides and insecticides, time of killing vines, and time of harvest. There seems to be little or no relationship between quality and price paid to growers. The quality in Maine in 1953 was good to excellent but no price.

Late Blight

It is often contended that breeding for resistance to late blight is more or less a waste of time, since the disease can be controlled by spraying with fungicides. Under normal conditions this may be true. But how often do normal conditions occur? The 1951 season was a bad blight year in Maine. Rains came at a time when the potatoes should have been sprayed. Susceptible

varieties such as Green Mountain and Irish Cobbler suffered severely both in vines and in tubers. The highly resistant varieties such as Kennebec, Cherokee, and Pungo came through with little or no injury from blight. The 1952 and 1953 seasons were unfavorable for blight, consequently the time and expense of applying fungicides were wasted.

In 1953 in a field test by Akeley et al. in which an attempt was made to create an epidemic of late blight^{on} all varieties, both susceptible and resistant, were free from blight throughout the growing season. Twelve sprays with basic copper were of no value and in a few cases seemed to be harmful to the plants. Resistant varieties would obviate the waste of time and fungicides involved in the spraying operations.

As was shown in the 1952 report, a large number of seedlings were screened for resistance at Beltsville, Md., using physiologic races of late blight that attack Kennebec. Of the survivors 3,779 were tested in Mexico with the specialized races occurring there. None of the seedlings was immune but some of them showed a fair degree of resistance. See the report from Mexico by John S. Niederhauser. From the breeding standpoint it is encouraging to note that certain progenies showed a much higher percentage of resistant seedlings than others.

In the fall of 1953 more than 40,000 seedlings were inoculated with a mixture of zoospores of five races of late blight D, C, B, BD, and BC, or, according to the new international system, 1; 2; 4; 1, 4; 2, 4. The original cultures were obtained from L. C. Peterson, Cornell University, Ithaca, N. Y. About 9,000 of the survivors will be sent to Dr. Niederhauser in Mexico for his tests in 1954. (See Beltsville Report by R. W. Buck et al.).

A short report from Guatemala shows the value of late-blight-resistant varieties in that country. The varieties Cherokee and Placid, as well as some seedlings tested, were practically immune from late blight. The European varieties Up-to-Date and Bintje, and some native varieties were killed in 8 weeks. Cherokee yielded about 300 bushels of U. S. No. 1 potatoes per acre; Placid about 250 bushels. The production of U.S. No. 1 tubers for Up-to-Date and Bintje was practically nil.

The outstanding advance in the late blight investigations is the proposed international system of designating interrelationships of genes and physiological races of the organism. See the West Virginia report by M. E. Gallegly.

Scab

The uniformity scab nurseries were grown again in 1953 in California, Maine, Michigan, Minnesota, North Dakota, Washington, Wisconsin, and Wyoming. The results of these tests are to be found in the reports from the respective States.

Some of the results were rather disappointing. In California the tubers of a number of seedlings that were 100% marketable in 1952 did not fare so well in 1953. In Washington State the tubers of seedling varieties that showed a fairly high degree of resistance in 1952 were more heavily scabbed in 1953. The results of some of the other tests were more encouraging. Breeding potato varieties, combining scab resistance with all the desirable characters of a good commercial type, is a complicated problem, as are many other potato-breeding problems.

Verticillium Wilt

The 1953 tests for resistance to verticillium wilt show some interesting relationships (See report by Akeley et al.). Selections from a number of progenies were included in the test. Only 21.9 percent of the seedling selections showed infection as compared with 85.7% infection in the Kennebec checks (P. I. table 11). Among the named varieties Ontario again showed the most resistance with 10% wilt. It also ranked first in yield. (P. I. table 13). There was not a significant correlation between yield and amount of disease. There was not a significant difference in yield between any two of the following varieties: Green Mountain, Houma, Katahdin, Kennebec, Mohawk, Menominee, Ontario, Sequoia, Teton, B 355-35, and B 606-67, although they ranged in wilt infection from 10% for Ontario to 63% for B 606-67.

Spindle Tuber

There seems to be little or no resistance to spindle tuber in any of the commonly cultivated varieties. In a test in which the vines of the varieties to be tested were switched with potato vines known to have spindle tuber 18 named varieties ranged in infection from 77.8 to 100 percent. The lowest infection 45.8% was found in seedling 41956 (P.I. table 16). We may have to search among the wild species for resistance to this disease.

Virus Y

Field resistance to virus Y under ordinary circumstances is found in several seedling varieties but when the plants are artificially infested with viruliferous aphids the results are different. As an example, three clonal lines that were reported to be field immune at the Plant Breeding Station, Corstorphine, Scotland, became infected with virus Y in the tests at Presque Isle, Maine in 1953 (P.I. table 17).

New Varieties

In 1953 Early Gem and Osage were named and released to growers. The Early Gem was released jointly by the United States Department of Agriculture, the North Dakota Agricultural Experiment Station, and the Agricultural Experiment Station of the University of Idaho. The Osage was released jointly by the United States Department of Agriculture and the Iowa Agricultural Experiment Station, Ames, Iowa.

Early Gem is an early variety producing medium-long, shallow-eyed, russet-skin tubers. It is resistant to scab. It is not widely adapted but will be valuable in certain sections of North Dakota and in the early district of Idaho.

Osage was produced and first grown at the U.S.-Colorado Potato Field Station, Greeley, Colo. It produces tubers oblong in shape, very smooth, shallow-eyed and in most places free from scab. In the north-central regional trials in 1951 and 1952 Osage produced a higher percentage of dry matter than the Irish Cobbler in 8 out of 10 tests. The most serious defects observed in Osage is its tendency to develop hollow heart. However, tests have shown that it is comparable to Irish Cobbler in this respect.

Three U.S.D.A. seedling varieties will probably be released in 1954: B 73-18 with Delaware, B 355-44 with New Hampshire, and B 606-67 with Maine.

B 73-18 is a high-quality late-blight-resistant variety that is promising in Delaware. B 355-44 is a high-quality variety resistant to both late blight and ring rot in the tests in Maine. It is promising in New Hampshire. It showed some resistance to early blight in the tests on the eastern shore of Maryland.

B 606-67 produces relatively high yields of high quality. It is field-immune from virus A, immune from virus X, and immune from the common races of late blight. It is the first seedling with this combination of characters that has been tested for 10 years. Its only defect is a tendency to produce off-type tubers under adverse conditions. It is no worse in this respect than Green Mountain or Cherokee.

Six lines are being increased in Nebraska with the possibility that they will be released to growers within the next few years. See Nebraska report for characteristics of these lines.

PLANT INDUSTRY STATION (Beltsville, Md.) and
CHAPMAN and AROOSTOOK FARMS (Presque Isle, Maine)
F. J. Stevenson, R. V. Akeley, E. S. Schultz,
R. W. Buck, Jr., and Lillian Cash

Plant Industry Station

The 1953 work at the Plant Industry Station followed the same plan as in former years with a few improvements in techniques.

Seed Production

It has been found that 3 hours of illumination from 11:00 p.m. to 2:00 a.m. is just as favorable for the production of seed as longer periods of light during the early hours of darkness. Seed of many crosses and selfed lines of cultivated types was produced. A relatively large amount of work was done too on crosses and selfed lines, involving wild species.

Distribution

The distribution of seed, new seedlings, and named and numbered varieties is given in Plant Industry tables 1 to 4. The seed, new seedlings from the greenhouse, and small lots of seedlings to foreign countries were shipped from the Plant Industry Station, but many shipments were made directly from Presque Isle, Maine.

P. I. table 1: Distribution of potato seed to State agricultural experiment stations and to foreign countries in 1953.

Territory or State	Cooperator	Progenies
		No.
Alaska	C. H. Dearborn	22
Louisiana	T. P. Dykstra	24
North Carolina	Frank L. Haynes, Jr.	11
West Virginia	M. E. Gallegly	8

P. I. table 2. Distribution of new seedlings from greenhouse at Beltsville, Md. in 1953.

Country or State	Cooperator	Progenies	Seedlings
			No.
Mexico	John S. Niederhauser	71	3,796
Louisiana	T. P. Dykstra	31	3,161
Maine	G. W. Simpson	33	6,370
Maine	R. V. Akeley	195	26,868
Ohio	J. P. Sleesman	15	2,199
North Dakota	W. G. Hoyman	31	3,662
W. Virginia	K. C. Westover	17	1,1983

P. I. table 3. Distribution of named and numbered varieties of potatoes to foreign countries.

Country	Cooperator	Varieties
		No.
Australia	N. S. Shirlow	3
Brazil	Florianio F. Guimaraes	241
Canada	G. W. Ayers	16
Canada	Deane Reed	4
Canada	N. M. Parks	1
Denmark	Borge Jacobsen	14
Germany	Frafft Fehr V. Crailsheim, Jr.	8
Holland	H. T. Huntington	9
Jordan	E. F. Vestal	8
Lebanon	C. L. Terman	13
Nicaragua	S. C. Litzenberger	10
Nigeria (Br.W. Africa)	T. A. Russell	7
Peru	Max Vera Bravo	11
South Africa	J. E. Vander Plank	1

P. I. table 4. Distribution of named and 6 numbered varieties to States.

State	Cooperator	Variety
California	Glen Davis	No. 33 <u>1/</u>
"	Glen Davis	20
Colorado	W. C. Edmundson	17
Connecticut	Arthur Hawkins	15
Delaware	E. P. Brasher	13
Florida	A. H. Eddins	36
"	Geo. D. Ruehle	3
Georgia	Raymond Sheldrake	12
Idaho	John G. McLean	3
Indiana	N. K. Ellis	3
Iowa	C. E. Peterson	11
"	W. J. Hooker	16
Illinois	C. Y. Arnold	5
Kansas	Elmo W. Davis	3
Louisiana	T. P. Dykstra	10
Maine	Lester A. Felt	2
"	I. B. Douglass	10
"	Wesley Porter	8
"	W. Libby	25
"	W. E. Highlands	21
Maryland	C. E. Cox	15
Massachusetts	K. J. Kucinski	12
"	Karl Koch	6
Michigan	E. J. Wheeler	35 <u>1/</u>
"	E. J. Wheeler	3
Minnesota	M. J. Thompson	6
"	O. C. Turnquist	35 <u>1/</u>
"	F. A. Krantz	3
Nebraska	H. O. Werner	3
New Hampshire	Paul T. Blood	3
New York	M. W. Meadows	26
"	J. Howard Ellison	12
"	L. C. Peterson	33
New Jersey	J. C. Campbell	12
North Carolina	Frank L. Haynes	4
"	Moyle E. Hayward	2
North Dakota	J. H. Schultz	6
"	W. G. Hoyman	35 <u>1/</u>
"	W. G. Hoyman	62
Pennsylvania	J. S. Cobb	11
"	R. H. Hartman	23
"	W. R. Mills	11
Rhode Island	C. R. Skogley	20
South Carolina	Wm. Epps	9

P. I. table 4 continued.

State	Cooperator	Variety
		No.
Virginia	P. H. Massey	20
"	M. M. Parker	10
Washington	J. D. Menzies	1
"	C. L. Vincent	2
"	J. D. Menzies	34 $\frac{1}{2}$
Wisconsin	R. H. Larson	27
"	G. H. Rieman	35 $\frac{1}{2}$
"	G. H. Rieman	11
Wyoming	W. J. Walters	35 $\frac{1}{2}$

1/ Uniform scab nursery.

Chapman Farm, Maine

During the growing season of 1953, 26 named and numbered varieties were increased on the Chapman Farm. The tops were macerated by rotobating August 31, and the stems remaining were sprayed with an arsenical September 1. Approximately 380 bushels of seed was saved from these varieties for distribution and other purposes.

A total of 244 seedlings were increased in 5-hill rows for the vitamin C test being carried on at Cornell University, Ithaca, New York. At harvest-time 4 samples of 5 tubers each were taken from each plot and taken to Cornell University by truck for vitamin C determinations.

This season 26,868 seedlings grown from true seed in the greenhouses at Beltsville, Md., were increased on the Chapman Farm. The germination was 99 percent and 10.9 percent of these were selected for disease resistance tests in 1954. Altogether, 195 family lines were grown and selections were made from 180 of them. Plant Industry table 5 gives a summary of the selections made from the single hills and the approximate number planned for each test in 1954.

P. I. table 5. A summary of single-hill seedlings grown on the Chapman Farm in 1953, showing the number planted, the number grown, the number selected, and the number intended for the 1954 disease tests.

Planted	Grown	Selected	Late blight	Scab	Ring rot	Virus X	Virus A	Virus Y	Vert. wilt	Leaf roll	L. bl tes Columbia	L. roll races
No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
6,868	26,588	2,908	1,328	1,478	231	458	1,927	417	768	383	1,249	586

Plant Industry table 6. Maturity and self fertility data for seedling varieties grown in 10-hill or multiple 10-hill rows on the Chapman Farm in 1953.

Maturity classes	Seedlings		Fertility classes	Seedlings	
	No.	Pct.		No.	Pct.
Very early	63	3.7	None	914	54.1
Early	177	10.5	Low	376	22.2
Medium	481	28.4	Medium	164	9.7
Late	928	55.0	High	236	14 .0
Very late	41	2.4			
	1,690	100.0		1,690	100.0

Maturity and fertility notes were taken on 1,746 seedlings in 10-hill plots on the Chapman Farm. The data are given in Plant Industry table 6. Over 42 percent of the seedlings were early or medium in maturity and 45.9 percent ranged from low to high in self fertility.

Yield Test Aroostook Farm Maine

Twelve medium and early maturing varieties were tested for yield and dry-matter content in 5 replications of 20 hills each.

The data for these tests are given in P. I. table 7.

B 962-3, a scab- and blight-resistant seedling of medium maturity yielded about the same as Cobbler for the second year and again was significantly higher than Cobbler in percentage of total solids.

B 922-6 a medium early seedling resistant to several specialized races of late blight was not significantly different from Cobbler in yield and was high enough in dry matter content to make it suitable for baking, chipping, or french frying.

P. I. table 7. Medium and early variety yield test on Aroostook Farm, Presque Isle, Maine in 1953.

Variety	U.S. No. 1 yield per acre		Total solids
	Bu.	Pct.	Pct.
Chippewa	481	94	19.4
Irish Cobbler	394	92	21.7
Keswick	430	97	22.6
White Cloud	301	87	22.0
OB 638-16	268	82	22.0
B 920-5	318	95	18.7
B 920-7	228	73	20.7
B 922-6	331	87	20.9
B 962-3	396	91	22.1
B 962-32	178	64	22.4
B 991-3	303	91	20.1
B 2909-6	306	92	18.9
L.S.D. at 5%	42.8		
" " 1%	57.2		

Late Variety Yield Tests

Five named and 6 numbered varieties were tested for yield and dry-matter content in 5 replications of 20 hills each.

The data for these tests are given in P. I. table 8. Kennebec, LaSoda, and B 2894-24 outyielded Katahdin. Kennebec outyielded all the others by odds of better than 99:1. The total solids of all the varieties in the test exceeded 19.7 percent, the present standard for potatoes considered suitable for chips, french fries, or baking purposes.

P.I.

Table 8. Late variety yield test on Aroostook Farm, Presque Isle, Maine, 1953

Variety	Yield per acre		Solids	Characters
	U.S.	No. 1		
	Bu.	Pct.	Pct.	
Canoga	489	91	21.5	Good quality in N.Y. State
Canso	410	90	23.2	Res. to late blight
Katahdin	463	94	21.7	" " mild mosaic, & net necrosis
Kennebec	572	97	21.2	" " late blight, mild mosaic and net necrosis.
LaSoda	457	94	20.3	Red skin
B 926-9	492	95	20.7	Res. to late blight and scab.
B 2067-1	359	90	20.8	" " scab; red skin
B 2340-2	426	97	21.2	" " " " "
B 2431-42	484	96	20.9	-----
B 2894-24	502	97	20.2	Res. to late blight, scab, mild mosaic
B 3170-5	398	94	20.1	" " " " and scab.
L.S.D. at 5%	33.5			
" " 1%	44.8			

Late Blight Resistance

The late-blight test for 1953 was carried on as usual in May and June in the greenhouse at Aroostook Farm. A total of 551 seedlings from 26 family lines were grown in 3-inch pots, transferred to an enclosed bench with an automatic humidifier, and inoculated with the common race of late blight. Also 55 parents and foreign introductions were tested. The latter part of August, 5 tuber samples were harvested from duplicate plots at Chapman Farm, placed in the storage house, and inoculated with common blight for a tuber-rot test.

P. I. table 9 gives a summary of these data. Over 58 percent, or 320 seedlings, were rated as 0, or free of late blight in their foliage. In the tuber test over 75 percent, or 418 seedlings, were graded as free from tuber rot.

The entire late-blight test was also planted in 2-hill plots in the field. The season was not satisfactory for a field-exposure test in spite of several artificial inoculations. It was hoped to obtain additional data on general field resistance.

P. I. table 9. Summary of the data obtained on the tests for resistance to late blight in the greenhouse at Presque Isle, Maine, 1953.

Material tested	No.	Foliage test <u>1/</u>						Tuber classes <u>2/</u>					
		1	2	3	4	5	6	0	1	2	3	4	5
	551	320	18	13	33	91	76	418	35	22	11	32	33

1/ Foliage classes:

- 1 = Free
- 2 = Occasional leaf infected
- 3 = One-half leaves infected
- 4 = Two-thirds leaves infected
- 5 = All but a few leaves infected
- 6 = All leaves dead

2/ Tuber classes:

- 0 = No rot on any tubers
- 1 = 1 out of 5 with late blight rot
- 2 = 2 " " 5 " " " "
- 3 = 3 " " 5 " " " "
- 4 = 4 " " 5 " " " "
- 5 = 5 " " 5 " " " "

Scab Resistance

F. J. Stevenson and R. V. Akeley

In 1953 on Aroostook Farm 17 family lines consisting of 367 seedlings were compared with the susceptible Green Mountain check for scab resistance. Two-hill plots of each seedling were planted with each one adjacent to a two-hill plot of Green Mountain. The level of infection was satisfactory this season. Results for this year are given in P.I. table 10. Over 24 percent or 90 of the seedlings showed a mean surface area coverage of a trace and over 21 percent or 67 had pustule type 1, which is considered the most resistant type. The 367 Green Mountain checks had over 92 percent or 339 occurring in class 3 for surface area coverage, and all of them were type 3 for pustules.

P. I. table 10. Summary of the data obtained from the scab tests on Aroostook Farm, Maine, in 1953.

Material tested	No.	Surface area covered <u>1/</u>						Type of pustule <u>2/</u>			
		T	1	2	3	4	5	1	2	3	4
Seedling varieties	367	90	175	71	31			79	105	183	
Gr. Mountain check	367			28	339					367	

1/ Surface area covered

- T = Less than 1%
- 1 = 1 to 20%
- 2 = 21 to 40%
- 3 = 41 to 60%
- 4 = 61 to 80%
- 5 = 81 to 100%

2/ Type of pustule

- 1 = Small, superficial
- 2 = Larger, but still superficial
- 3 = Large, rough pustules
- 4 = Large pustules, shallow holes
- 5 = Large pustules, deep holes.

Verticillium Wilt Resistance
R. V. Akeley, F. J. Stevenson, D. Folsom, and R. Bonde

The tests for verticillium wilt resistance to infection from infested soil were continued on the same field again in 1953. Twelve family lines, totaling 312 seedlings and 31 selections from the breeding plot were included in the 5-hill row test. Kennebec, Houma, and Katahdin used as checks were planted at 50-row intervals. P. I. table 11 gives the results for this test.

The general level of infection was less this year, even though the field being used has been planted to potatoes continually since 1950. Fifty-six seedlings or 18 percent of the 312 tested remained uninfested. Five selections of Katahdin selfed, 2 out of 3 of Chippewa selfed, and several parents were free of infection when they were replanted this year.

P.I. table 11. Verticillium wilt resistance test, 5-hill plots on the Ashby Farm, Caribou, Maine.

Pedigree number	Parentage	Select.	Select.	Select.	Readings based on total hills		
		tested	infected	Infected	Infected	Free	Infected
		No.	No.	Pct.	No.	No.	Pct.
B 3311	B 754-16 x Menominee	12	11	91.7	34	26	56.7
B 3312	Houma x Ac 25673	5	2	40.0	4	21	16.0
B 3314	Houma x Menominee	60	47	78.3	152	148	50.7
B 3316	41956 x Earlane	37	33	89.2	115	70	62.2
B 3317	B721-1 x Menominee	48	47	97.9	157	83	65.4
B 3318	B 936-12 x Ac.25673	8	6	75.0	10	30	25.0
B 3319	B936-12 x Menominee	35	31	88.6	106	69	60.6
B 3352	Saranac x Teton	19	14	73.7	33	62	34.7
B 3355	B 721-35 x B 355-24	17	17	100.0	53	32	62.3
B 1360	Ac.25673 selfed	31	12	38.7	21	134	13.5
B 1261	Menominee selfed	12	9	75.0	31	29	51.7
B 1378	Kennebec natr. pol.	28	27	96.4	86	54	61.4
Family lines total		312	256	82.0	802	758	51.4
Kennebec	checks for 5-hills	7	7	100.0	30	5	85.7
Houma	do	7	6	85.7	16	19	45.7
Katahdin	do	7	7	100.0	18	17	51.4
Breeding material		31	13	41.9	34	121	21.9

From the verticillium wilt yield test on the Ashby Farm in 1952, tuber samples were taken at random from the grader at harvesttime for specific-gravity determinations. These lots were saved, examined, and sorted for wilt symptoms in the spring of 1953. With a seed knife thin slices were cut off the stem end of each tuber. The ones showing brown discoloration were classified as diseased and the others as free. Approximately 20 whole tubers of each variety from 2 replications were examined and planted on wilt-free soil to observe the results of this separation. The data are given in P. I. table 12.

P. I. Table 12. Verticillium wilt test of varieties for symptoms, and the results after planting on clean soil. (R. Akeley, D. Merriam, and F. J. Stevenson)

Variety or seedling	Tubers examined & grown	Tuber symptoms				Variety or seedling	Tubers examined & grown	Tuber symptoms			
		Free		Diseased				Free		Diseased	
		Grn. Dis.	Grn. Dis.	Grn. Dis.	Grn. Dis.			Grn. Dis.	Grn. Dis.		
	No.	No.	No.	No.	No.		No.	No.	No.	No.	
Cherokee	40	1	1	39	39	Sebago	38	3	1	35	20
Chippewa	40	23	1	17	10	Sequoia	40	26	0	14	4
Erie	40	16	2	24	4	Teton	37	8	2	29	16
Essex	40	37	4	3	1	Triumph	40	23	14	17	8
Gr. Mountain	40	17	2	23	0	41956	40	39	0	1	0
Irish Cobbler	40	7	7	33	26	X792-88	40	26	1	14	2
Katahdin	40	27	2	13	6	X792-94	40	36	1	4	0
Kennebec	38	4	4	34	30	X927-3	38	30	0	8	3
Menominee	40	33	11	7	2	B 73-10	40	3	1	37	27
Mohawk	40	6	0	34	7	B 355-35	40	4	1	36	4
Ontario	39	30	3	9	1	B 355-44	39	3	0	36	5
Pungo	40	0	40	40	40	B 447-98	40	19	2	21	12
Rus. Burbank	40	25	0	15	1	B 595-76	40	11	1	29	17
Rus. Rural	40	13	2	27	13	B 606-67	40	25	5	15	2
Totals							1109	495	68	614	300

A total of 1,109 tubers from 28 varieties were grown and examined in the field for wilt symptoms. Of the 495 visibly healthy tubers planted only 68 or 13.7 percent showed diseased plants, and of the 614 visibly diseased tubers only 300 or 48.8 percent produced wilted plants. Varietal differences are also evident.

Twenty-three named or numbered varieties were grown in wilt-infested soil on the Ashby Farm Caribou, Maine. They were planted in 20-hill rows, replicated 5 times. The data for this test are given in Plant Industry table 13. The lowest infection (10%) was found in Ontario; the highest in Pontiac (80%). S41956 and two selections from a cross of S41956 and Earlane showed 15% infection or less. These selections also showed resistance grown in wilt-infested soil in Idaho.

Again, as in 1952, the yields of some varieties were relatively high in spite of a high percentage of infection. Ontario ranked first in yield with 466 bushels of U.S. No. 1 potatoes per acre (P.I. table 13). However, it was not significantly higher in yield than 10 others. It is interesting to note that the percentage of dry matter found in the tubers of Ontario was exactly the same as that for Green Mountain.

P. I. table 13. Reaction to verticillium wilt as reflected in yields and dry-matter content of 23 varieties of potatoes grown in wilt-infested soil on the Ashby Farm, Caribou, Maine, in 1953.

Named or numbered variety	Wilt	U.S. No. 1 yield per acre		Dry matter
		Bu.	Pct.	Pct.
Canso	51	267	81	18.9
Cherokee	75	311	86	19.3
Chippewa	58	364	88	17.0
Green Mountain	44	451	93	18.5
Houma	21	428	93	19.4
Irish Cobbler	53	275	85	18.7
Katahdin	42	415	91	18.0
Kennebec	54	412	94	18.4
Keswick	57	319	93	18.1
Mohawk	35	440	95	20.4
Menominee	45	422	94	18.2
Ontario	10	466	91	18.5
Pontiac	80	399	89	16.7
Pungo	65	331	90	19.4
Sebago	62	317	82	18.2
Sequoia	50	426	94	17.7
Teton	41	412	95	19.1
S 41956	15	393	84	20.5
X 792-88	15	367	77	19.0
X 792-94	13	338	78	20.9
B 73-18	54	305	93	19.9
B 355-35	41	427	90	18.9
B 606-67	63	440	88	20.3
L.S.D. at 5%	23.0	54.9		0.07
" " 1%	30.3	64.9		0.09

A covariance analysis for the data on wilt and yield gave a correlation coefficient of -0.17, which is not significant. This is somewhat surprising since John McLean working in Idaho, gets high significant negative correlations between wilt and yield.

Fungicides and Insecticides,
Effects on Yield and Percentage of Total Solids
in Certain Varieties of Potato
R. V. Akeley, F. J. Stevenson, and Raymond Buck, Jr.

The test to determine the effect of different sprays on yield and percentage of total solids was continued in 1953. The same 6 varieties, Katahdin, Green Mountain, Sebago, Cherokee, Pungo, and Kennebec, were included in the test, but the sprays applied were somewhat different. The check plots were sprayed with water; the fungicide used was basic copper, 4 pounds to 100 gallons of water; the insecticide was a mixture of DDT, 1 quart (25% emulsion) in 100 gallons of water and Parathion 1 pint (25% emulsion) in 100 gallons of water. Twelve sprays were applied at weekly intervals beginning on June 18. Green Mountain plants infected with the common race of late blight were placed at frequent intervals throughout the test plot. Teton, a variety very susceptible to late blight, was grown after every three rows of the varieties in the test. Temperature and moisture conditions were such that all varieties were free from blight throughout the growing season. As a result, the value of basic copper as a fungicide could not be determined.

However, some of the other relationships are worthwhile, as can be seen by the data given in P. I. table 14.

The plots sprayed with water yielded on the average higher than the corresponding plots sprayed with basic copper and almost as much as those sprayed with basic copper + DDT + Parathion. It would appear that the basic copper had a tendency to suppress yields in all the varieties tested. The plots sprayed with the insecticides alone ranked first in yield. This is true again for all 6 varieties. Kennebec ranked first in yield in all comparisons except in the plots sprayed with basic copper where it was outyielded by Green Mountain. On the average for all 4 treatments Kennebec outyielded the other 5 varieties significantly.

The percentage total solids was relatively high for all varieties and all treatments. The plots sprayed with the DDT + Parathion were significantly lower statistically than corresponding plots in the other treatments but such small differences would likely not be apparent in any cooking test.

Effect of Size of Seedpiece and Depth of Planting on Yield of Katahdin

In 1953 a study was made of the effect of seedpiece size on the yield of Katahdin and the effect of depth of planting on the amount of sunburn on the tubers. A split-block design was used. The main plots were planted with seed-pieces of 4 sizes: 0.5, 1.0, 1.5, and 2.5 ounces. The sub-plots were planted at 3 different depths: 1.5, 2.4, and 4.0 inches. The data for these tests are given in P. I. table 15.

P. I. table 14. Effects of fungicides and insecticides on yield and percentage of total solids on certain varieties of potatoes.

Sprays applied, yield U.S. No. 1, and specific gravity												
Basic copper : Basic copper + DDT + parathion: DDT + parathion : Water												
Variety	Total					Total					Total	
	U.S. No.1	solids	U.S. No.1	Pct.	Total solids	U.S. No.1	Pct.	Total solids	U.S. No.1	Pct.	Total solids	
Katahdin	Bu. 446	Pct. 90	Bu. 498	Pct. 93	19.9	Bu. 530	Pct. 94	19.2	Bu. 446	Pct. 91	19.9	
Green Mountain	550	95	535	96	21.1	622	97	21.0	541	96	21.9	
Sebago	448	91	489	93	19.6	547	95	19.2	514	93	19.9	
Cherokee	414	91	458	93	20.2	486	93	19.4	455	94	20.4	
Pungo	464	96	516	98	20.0	581	98	20.2	526	97	20.4	
Kennebec	511	96	611	97	20.4	654	97	19.8	580	95	20.2	
Means	467	93	518	95	20.0	570	96	19.8	510	94	20.5	
Means	Bu.	Pct.	Total solids		pct.							
Katahdin	472	92	19.7									
Green Mountain	562	96	21.5									
Sebago	500	93	19.7									
Cherokee	453	93	20.1									
Pungo	522	97	20.3									
Kennebec	589	96	20.2									
L.S.D. at 5% level for two varieties with same treatment												
" " " "	" " " "					variety means		Yield Bu.		Total solids pct		
							48.9		0.070			
							24.5		0.035			

P. I. table 15. Yields, percentages of No. 1 tubers, and percentage total solids of Katahdin planted with 4 sizes of seedpiece and at 3 different depths.

Seed size	Yield of		Solids
	U.S. No. 1 per acre		
Ounces	Bu.	Pct.	Pct. <u>1/</u>
0.5	388	92.6	21.6
1.0	412	89.3	21.6
1.5	469	89.9	21.6
2.0	474	89.0	21.4
L.S.D. at 5%	32.5		
" " 1%	45.0		
Depth of <u>planting</u> Inches			
1.5	432	88	21.6
2.5	435	91	21.6
4.0	441	91	21.4
L.S.D. at 5%	24.4		
" at 1%	33.8		

1/ There were no significant differences in percentage total solids due to size of seedpieces or planting depths.

There were highly significant differences between the yields of the plots planted with the two smaller seedpieces (0.5 and 1.0 ounces) and those planted with the two larger seedpieces (1.5 and 2.0 ounces). There was no significant difference in yield between the plots planted with seedpieces weighing 1.5 ounces and the plots planted with seedpieces 2.0 ounces. There were no significant differences in either yield or greening resulting from the three planting depths. There was no significant difference in percentage total solids due to size of seedpieces or planting depths.

Spindle Tuber Test for Resistance R. V. Akeley, D. Merriam and R. Bonde

In 1952, 30 varieties or seedlings were planted in 6 randomized blocks with 20 seedpieces per plot. When the foliage was about 1 foot high all the plants were switched with potato vines known to have spindle tuber. At harvesttime one tuber from each hill was taken for replanting in 1953 in order to determine

the amount of infection. This test was replanted and inspected for spindle tuber symptoms in 1953.

P. I. table 16 gives the results for all the varieties. A total of 3,566 tubers were grown and 3,165 or 88.7 percent had contracted the disease by using this method of inoculation. This is a high level of infection for one season and only one treatment of switching. Only two seedlings X792-88 and 41956, had less than 50 percent of diseased plants showing.

No appreciable resistance to spindle tuber was found in the varieties tested but the techniques and results are reported here for the benefit of those who may be breeding for resistance to spindle tuber.

P. I. table 16. Spindle tuber resistance test. 1952 and 1953.

<u>Variety</u>	<u>Spindle tuber</u> Pct.
Cherokee	100.0
Chippewa	88.3
Erie	96.6
Essex	99.1
Green Mountain	90.8
Irish Cobbler	98.3
Katahdin	94.7
Kennebec	98.3
Menominee	85.0
Mohawk	85.0
Ontario	93.9
Pungo	95.0
Russet Burbank	77.8
Russet Rural	97.5
Sebago	94.9
Sequoia	95.0
Teton	93.3
Triumph	94.1
41956	45.8
X96-56	96.6
X792-88	49.6
X792-94	84.8
X927-3	90.3
B 73-10	95.0
B 355-35	90.8
B 355-44	97.5
B 447-98	88.2
B 515-2 (Early Gem)	80.8
B 595-76	75.8
B 606-67	90.0
	<hr/> 88.7

Resistance to Virus Y

E. S. Schultz; R. V. Akeley and F. J. Stevenson

Progress in producing varieties that are resistant to virus Y has been slow. In 1953 22 named or numbered varieties and 364 seedlings representing 15 progenies were planted in a field-exposure test. Fifty to 100 viruliferous aphids, Myzus persicae, were placed on each hill when the plants were 5 to 10 inches tall. The results of this test are given in P. I. table 17.

Perhaps no definite conclusions can be drawn from 1 year's test but a few interesting relationships can be pointed out.

B 2067-52, B 922-3, and Katahdin have shown field resistance to virus Y. The progenies that had one or two of these as parents showed a relatively high percentage of their seedlings free from virus Y. For example, 24 seedlings of the cross Katahdin x B 2067-52 were free from virus Y. Seedlings in Ac. 25941 and Ac. 25942 were grown from seed sent to us by K. O. Muller when he was working in Cambridge, England. According to Dr. Muller's notes, these populations should segregate for hypersensitivity to all strains of virus Y but none of the 42 seedlings escaped infection in this field-exposure test. Ac. 25828, Ac. 25830, and Ac. 25832 were clonal lines sent to us from the Plant Breeding Station, Corstorphine, Edinburgh, Scotland. According to the record that accompanied the tubers, these three varieties were supposed to be field-immune from virus Y. All three were susceptible in the field-exposure tests at Presque Isle, Maine in 1953

P. I. table 17. Varieties and seedlings tested for resistance to virus Y in the field-exposure tests at Presque Isle, Maine, in 1953.

Variety or pedigree	Parentage	Varieties	Free from virus Y
		No.	Pct.
B 3172	B 982-16 x B 991-13	4	25
B 3186	B 1115-14 x 982-16	6	100
B 3209	Katahdin x B 2067-52	24	100
B 3260	Ac. 25828 x B 922-3	11	45
B 3262	Ac. 25830 x B 922-3	2	50
B 3298	B 936-12 x B 2067-52	82	64
B 3334	B 402-1 x B 2067-52	12	41
B 3335	B 505-44 x B 2067-52	26	54
B 3336	B 524-53 x B 2067-52	6	63
B 3337	B 982-8 x B 2067-52	49	22
B 3338	B 982-16 x Katahdin	22	41
B 3339	Ac 25830 x Katahdin	36	11
Ac 25941	Miller's No. A 2077	20	0
Ac 25942	" "	22	0
B 1366	B 982-8 selfed	42	2
Katahdin	40568 x 2462	1	0
Ac 25828	Aust. sdg. x blight res. sdg.	1	0
Ac 25830	" " x Gladstone	1	0
Ac 25832	" " x Blight resistant	1	0
Canso	Canada blight resistant	1	0
Keswick	" " "	1	0
B 402-1	(X499-a) x (X528 x 349)	1	0
B 505-44	Chippewa x Teton	1	0
B 524-53	(X1241-62) x (X792-76)	1	100
B 913-13	055 x B 355-24	1	0
B 936-12	(X792-94) x B 294-38	1	100
B 982-8	Chippewa x (X792-94)	1	25
B 983-5	(X792-88) x (X792-94)	1	0
B 985-11	Mohawk x (X792-94)	1	0
B 991-3	B 355-24 x B 81-40	1	0
B 2067-10	Chippewa x B 381-2	1	50
B 2068-23	Chippewa x B 523-33	1	0
B 738-8	Katahdin x Cherokee	1	0
Kennebec	B 127 x (X96-56)	1	0
B 922-3	TI5 x B 355-24	1	100
B 3092-30	Chippewa x B 929-6	1	100
B 3172-3	B 982-16 x B 991-13	1	25

Late Blight Resistance
R. W. Buck, Jr., Lillian Cash, and F. J. Stevenson

During September and October 1953, 44,210 seedlings from 90 crosses and 12 selfed lines were inoculated with a mixture of zoospores of races B, C, D, BC, and BD of Phytophthora infestans. The original cultures were obtained from L. C. Peterson, Cornell Agricultural Experiment Station, Ithaca, N. Y.

One or both of the parents of the progenies were immune to one or more of the races of P. infestans.

The seedlings were inoculated at an early stage of development while in the seed flat. During the test period the seedlings were placed in a cage in which the temperature was automatically controlled. The humidity was kept high by frequent sprays of water from a fine nozzle.

Sporangia were produced on infected plants within 5 to 7 days after inoculation. All plants upon which sporangia developed were counted and discarded. Seedlings that were free from infection or upon which sporangia did not develop were transplanted into pots.

The data for this test are given in P. I. table 18. Of the 44,210 seedlings inoculated 9,768 or 22.1 percent survived.

P. I. table 18. Summary of data obtained from late-blight inoculation test of seedlings at Beltsville, 1953.

Crosses and lines	Seedlings inoculated	Seedlings infected		Seedlings surviving	
		No.	Pct.	No.	Pct.
90 crosses	40,453	31,585	78.9	8,868	21.1
12 selfed lines	3,757	2,857	76.0	900	24.0
Total	44,210	34,442	77.9	9,768	22.1

Tubers harvested from seedlings surviving the late-blight test in 1952 were grown in the field at Toluca, Mexico, in 1953. For the results of this test see report by J. S. Niederhauser, Mexico.

Solanum species
R. W. Buck, Jr.

Investigations on the cytological behavior and crossability of Solanum species and hybrids were made in 1953. As a result of controlled pollinations, seed was obtained from 18 self or intraspecific pollinations, 37 interspecific pollinations, 12 triple hybrid pollinations, one double hybrid backcrossed to S. tuberosum, two triple hybrids backcrossed to S. tuberosum, and two diploid $F_1 \times F_1$ pollinations.

The success of two triple hybridizations and two selfed lines was made possible by the doubling of the chromosome number by colchicine treatment of sterile triploid hybrids.

SOUTHERN PROJECT
(Louisiana Headquarters)
T. P. Dykstra

The objectives of the southeastern potato-improvement project remain the same as those reported last year.

Primary attention continues to be given to the production of early, high-yielding, red-skin varieties, resistant to late blight and scab and well adapted to growing conditions of the deep South, and of those prevailing in the seed-producing areas of the North.

For the highly elevated, later-maturing sections of Tennessee, Georgia, North Carolina, and in certain other white potato-producing areas in the South, an effort is being made to develop a white variety of medium maturity resistant to late blight and scab and well adapted to the growing conditions of these areas.

The total rainfall during the 1953 season at Crossville, Tenn., was normal but during the critical period of tuber formation it was quite dry, and as a result the yield was below normal. At the time the plants were flowering and ready for pollination, the temperature during the daytime was about 100° F. As a result, a very low set of seed balls was obtained from our crosses.

Dr. Stevenson had made in the greenhouse at Beltsville several crosses with our seedlings that we wished to improve and with varieties resistant to late blight and possessing other desirable qualities. Through this cooperation it has been possible to obtain combinations of characters impossible to obtain under Louisiana or Tennessee climatic conditions.

In making selections at Crossville, Tenn., it is the practice to eliminate seedlings that are not resistant to disease and that on account of sterility cannot be used as parents. This is especially true of white seedling varieties of which there are many that are disease resistant. We have a comparatively small number of satisfactory red seedlings that are resistant. For this reason, a larger number of red seedlings than white ones, not resistant to disease but fertile and possessing other desirable characters, are retained to test for adaptability.

Formerly only enough tubers of new seedlings were sent to cooperators to be grown for general observation. This has not proved satisfactory as an evaluation test, and a sufficient number of tubers is now sent to permit a preliminary yield test of at least 3 replications of 25 hills each. Table 1 (Dykstra) gives the states to which seedlings were sent in 1953.

Some of the seedlings are more susceptible to unfavorable climatic conditions prevailing during part of the growing season than others, and this undoubtedly is the reason that in some locations a seedling may yield

extremely low whereas in other places it yields very satisfactorily. This was particularly illustrated in Homestead, Fla., this year. Some of the varieties and seedlings gave a good yield, but in the same plot, others which in the past have produced a very satisfactory yield developed practically no tubers.

Dykstra table 1. Seedlings sent to cooperating States in 1953.

State	Seedling varieties	Resistant to blight	Resistant to scab
	No.	No.	No.
Alabama	16	7	4
Florida, Hastings	29	22	3
" Homestead	17		7
" Belle Glade	20	18	5
Georgia, Mountain Station	14	13	1
" Savannah	20	12	3
Louisiana	12	7	5
Mississippi	17	6	6
North Carolina	13	11	1
South Carolina	16	13	4
Tennessee	13	10	2
Texas, Weslaco	24	4	6
" Panhandle	10	8	2

The data for these tests will be found in the reports of the respective States in which they were grown.

Of the cooperating States, Louisiana and North Carolina maintain a State potato-breeding program and have facilities to increase their seedlings. In addition to the seedlings obtained from their own crosses, they test seedlings sent to them from our increase plots in Tennessee. Any of these that appear to be promising in their tests are retained, increased, and used later in replicated yield trials. They use their own number for this material, but have a key to identify the original numbers, as maintained on the same seedlings grown at Crossville, Tenn.

In Louisiana uniform scab infection on the seedlings in scab plots is difficult. Application of manure, cover crops, lime, and inoculation by means of macerated scabby potato peelings have failed to bring about uniform soil infestation. The reason for this is unknown, but it appears to be due to antibiotic activities rather than to climatic conditions. Weekly plantings over a period of 8 weeks failed to show ^{any} difference in amount of infection due to date of planting.

A method that appears to be very promising and is giving uniform infection has been devised to test seedlings for scab resistance in the greenhouse. The

casual organism of scab, Streptomyces scabies, is grown in large bottles on nitrate-sucrose agar, in which it grows exceptionally well. This medium is prepared as follows:

Sodium nitrate (NaNO_3)	2.0 grams
Dipotassium phosphate ($\text{K}_2\text{H PO}_4$)	1.0 grams
Magnesium sulphate ($\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$)	0.5 grams
Potassium chloride (KCl)	0.5 grams
Ferrous sulphate ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$)	trace
Sucrose	30 grams
Water	1000 ml.
Adjust to pH 7	15 grams
-agar	

After a satisfactory growth of mycelium has developed, mycelium and media are removed from the bottles, placed in a Waring blender, to which water is added, and the contents are thoroughly blended. The result/^{ing}suspension is thoroughly mixed with the vermiculite and placed in specially constructed flats. Seedlings are planted in it at a distance of about $\frac{1}{4}$ square inches apart and are watered at regular intervals with a nutrient solution. At digging time it is easy to remove plant and attached tubers intact from the vermiculite and to take readings on amount and type of scab infection on the tubers.

On account of temperature conditions, December is the best time to obtain late-blight infection on seedlings in the moist chamber in the greenhouse. The same method of infection described in previous reports continues to give satisfactory results.

U.S. - COLO. POTATO FIELD STATION (Greeley, Colo.)

W. C. Edmundson

Potato-breeding studies for 1953 consisted of breeding for scab resistance with cooking quality, using both red and white varieties. Some of the parent material was supplied from Beltsville; to this was added the most promising scab-resistant lots developed at Greeley. Many of the parent lots were selected because of their high specific gravity.

The 1953, tests included the first-year seedlings in family lines, second-year seedlings in 5-hill lots, increase plots in 32-hill lots, older seedlings tested on a field basis, and yield test of seedlings.

In addition to test plots at the Station, seed of all lots planted in the 32-hill plots and the extra increase lots were supplied to the Colorado A & M College for testing in other parts of the State. The same lots were also supplied to L. A. Schaal for scab-resistance studies.

The growing season of 1953 was favorable for potato production, especially for the late crop. The yield per acre was about normal and the quality of the crop was very good. There was considerable fusarium tuber rot in the early crop of the Gilcrest district, but no late blight was noted in either the early or the late crop.

Flea-beetle injury was not very severe in most fields, which was probably due to good spraying and dusting and to the dry season. The precipitation was very low for the growing season of 1953. There was but 2.55 inches of rain recorded at the Station from June 1 until after harvest. There was but 0.18 inches in August and none for September. The psyllid population was low according to the counts made in the check plot of the spraying experiment. There were indications early in the season that there would be a heavy infestation of psyllids this year. All seedling plots were sprayed five times with D.D.T. and Parzate.

The 1953 family lines were planted May 14. Planting the family lines the middle of May has given better results than planting in June, the early planting resulting in large-size tubers. A large number of good-type white seedlings were retained at time of harvest. With the red selections it was entirely different. Most of the dark-red seedlings were of poor type with deep eyes, so very few were selected. Of the 1953 seedlings, 920 have been selected for testing in 1954.

In the test of second-year seedlings 1953 were planted in 5-hill lots. Because of the favorable growing season a large number of seedlings were retained at time of harvest. These lots have been re-examined, and all lots infected with scab, those indicating a tendency to growth cracks, or having other objectionable features have been discarded. All lots that were retained for further tests will be planted on a tuberunit basis in 32-hill lots at the station in 1954. These lots will be tested for scab resistance at two different locations. The remaining tubers of each lot were retained and will be tested by members of the staff of the State Experiment Station.

One hundred sixty-eight older seedlings were planted in 32-hill lots on a tuber-unit basis. All lots were retained at time of harvest for closer study. All of these lots were later weighed and carefully examined for scab, growth cracks, and other defects. Specific gravity readings were made of all lots that were retained for further test. The lots that were retained will also be tested at different locations by State cooperators. Of the older seedlings 36 were planted on a field basis in tuber units; some were planted in half-row plots, some in full row plots 535 feet long.

Seed from 46 crosses was planted in the greenhouse on August 6. About half of the lots were from crosses made last spring in the greenhouse, the other half was from seed produced the previous year. In past years the current-year's seed was slow to germinate. This year the new seed germinated uniformly within a few days of the time required for the 1-year-old seed to germinate. The seedlings were potted the first week in September. Seed from 22 crosses in which red parents were used were included in the plantings; however, only a small number of dark-red tubers were obtained. A list of red parent crosses, together with the number of dark-red, medium-red, light-red, and white tubers produced, is given in Greeley table 1.

Greeley table 1. Red crosses 1954 family lines, Greeley, Colo.

Cross No.	Parentage	Dark red No.	Medium red No.	Light red No.	White No.
25	C.S. 7137R x B 2340-2R	3	8	26	37
26	B 2067-1R x 10585 R		4	41	101
27	B 2340-2 R x 10585 R		3	34	132
28	B 2340-2 R x B 2337-2R		5	27	140
29	B 2340-2 R x C.S. 7187 R		3	22	66
30	C.S. 9741 R x B 2340-2 R	1	4	26	87
31	C.S. 9741 R x C.S. 10585 R		2	26	103
32	N 209-42-1 R x B 2340-2 R	8	12	33	46
33	B 400-1R x B 2340-2 R	1	2	16	99
34	B 2847-3 R x B 2340-2 R		1	20	59
35	B 2159-1R x B 2340-2 R	1	3	19	65
36	C.S. 7139 R x B 2337-2 R	3	5	21	47
37	B 2337-2 R x B 2340-2 R		1	10	73
38	C.S. 11011 R x B 381-2 R			14	128
39	B 381-2 R x C.S. 11002 R		7	27	102
40	C.S. 10999 R x B 381-2 R	1	8	26	125
41	B 2162-18 R x C.S. 10999 R		4	19	50
42	B 381-2 R x B 2162-18 R	2	5	35	116
43	B 381-2 R x 2337-2 R		1	19	157
44	C.S. 11002 R x B 2162-18 R		1	5	57
45	C.S. 7724 R x C.S. 10999 R		2	10	49
46	C.S. 11082 x C.S. 2162-18 R		4	13	53
	Totals	20	85	489	1942

Grand total 2536

In a yield test plot 28 seedlings and varieties were included. The plot consisted of 25 hills randomized and replicated 5 times. The tubers were graded for size above and below 2 inches in diameter. Tubers from each of the 5 replications were used to determine the specific gravity of each seedling or variety. The data for yield and dry-matter content are given in Greeley table 2.

Greeley table 2. Yield test, Greeley, Colo., 1953.

Variety	Mean total yield per acre	Mean weight above 2"	Mean specific gravity	Dry matter
	Bu.	Pct.		Pct.
B 73-18	421	96.5	1.0884	21.4
B 381-2	454	86.7	1.0915	22.2
Early Gem	622	97.4	1.0678	17.0
B 606-67	733	97.4	1.0959	23.0
B 926-9	663	97.3	1.0793	19.7
B 962-3	524	96.3	1.0875	21.2
B 962-32	485	92.8	1.0888	21.4
B 991-14	97	87.9	1.0675	16.9
B 2067-1	403	73.1	1.0925	22.4
B 2368-4	673	93.3	1.0909	21.9
B 2368-6	574	92.8	1.0710	17.7
B 2368-11	633	89.1	1.0778	19.2
Katahdin	560	95.0	1.0851	20.9
Triumph	575	95.3	1.0764	18.9
Pontiac	671	96.0	1.0747	18.4
De Sota	557	86.1	1.0790	19.7
Rus. Burbank	470	76.7	1.0885	21.4
B 505-53	592	89.5	1.0680	17.2
C.S. 8381	614	92.2	1.0638	16.2
C.S. 9741	620	90.5	1.0798	19.7
C.S. 9947	573	96.2	1.0845	20.7
C.S. 10060	546	90.2	1.0860	20.9
C.S. 10581	587	89.7	1.0743	18.4
C.S. 10857	538	94.9	1.0746	18.4
C.S. 10526	511	89.5	1.0879	21.4
C.S. 10592	501	81.1	1.0791	19.7
C.S. 5228	535	89.4	1.0769	18.9
C.S. 8439	357	86.1	1.0894	21.7
L.S.D. 5%	99.9	4.8	0.004	
" 1%	132.2	6.4	0.005	

The parentage and dry-matter content of some of the most promising seedlings are given in Greeley table 3.

Greeley table 3. Parentage and dry matter of some of the most promising seedlings.

Seedling	Parentage	Dry matter
		Pct.
9947	CS 3436 x 245-186	20.4
10060	Katahdin x 627-126	21.2
10135	627-126 x Earlane	21.4
10513	President x Yampa	21.2
10522	CS 3088 x 245-186	23.0
10526	CS 3088 x 245-186	22.4
10854	Katahdin x CS 5244	23.0
1099R	CS 9310 x CS 7941	21.7
11002R	CS 9310 x CS 7941	20.9
11012R	CS 9310 x CS 9741	21.2
11013R	CS 9310 x CS 9741	22.4
11016R	CS 9310 x CS 9741	21.9
11233	B 76-23 x B 926-9	20.0
11444	CS 1546 x B 926-9	20.9
11504	CS 9492 x B 61-3	22.7
11565	B 929-19 x CS 6320	22.7
11591	B 929-19 x CS 6320	24.5
11622	CS 7961 x B 926-9	22.4
11626	CS 7961 x B 926-9	20.2
11705	CS 10099 x B 927-32	21.9
11722	CS 10099 x B 927-32	20.9
11726	CS 10099 x B 927-32	22.2
11730	CS 10099 x B 927-32	22.2
11737	CS 10099 x B 927-32	20.7
11751	CS 10099 x B 927-32	22.7
11785	CS 10099 x B 927-32	19.9
11827	B 927-32 x B 773-8	19.9
11833	B 927-32 x B 773-8	20.7
11863	B 904-6 x B 927-32	20.7
11875	B 904-6 x B 927-32	19.9
11958	B 927-32 x B 991-3	23.2
11969	B 927-32 x B 991-3	22.7
11976	B 927-32 x B 991-3	24.2
12109	Yampa x B 927-32	22.4
12114	Yampa x B 227-32	21.7
12122	Yampa x B 927-32	21.7
12145	Yampa x B 927-32	21.4
12240	627-164 x B 927-32	23.2
12268	627-164 x B 927-32	21.9
12368	B 2085-7 x B 927-32	23.7
12558	CS 9887 x B 381-2	21.7

INTER-REGIONAL POTATO INTRODUCTION AND PRESERVATION STATION
R. W. Hougas and R. W. Ross

Introduction of New Stocks

The introduction of new *Solanum* stocks is guided by the requests of the technical workers. The majority of requests are for stocks that carry resistance to one or more of the economically important potato diseases of this country. This year seed and tubers were introduced from Argentina, Bolivia, Brazil, Costa Rica, England, Germany, India, Mexico, Netherlands, Peru, and Scotland. The introductions included commercial varieties, the more-promising advanced-breeding selections, wild species, and species hybrids.

Increase and Distribution of Stocks

In 1953 seed and tuber increase of stocks were satisfactory. Some reduction in seed increase from the field occurred as a result of unfavorable weather in August and September. Propagation under glass continues to be the most desirable and effective method of obtaining seed and tuber increase of many *Solanum* introductions. The increase obtained in the greenhouse was, in general, very satisfactory. Propagation facilities, usable during the summer growing season, have been expanded through the erection of insect-proof, sash-houses.

Maintenance of *Solanum* stocks as true seed is much easier and more economical than maintenance of stocks as clonal lines. Some stocks, commercial varieties, advanced breeding selections, etc. must be maintained as clonal lines. Methods for obtaining seed increase of clonal lines which are normally self-incompatible have been investigated during the past year. In preliminary trials, two techniques show promise. Although the trials conducted were not extensive, the results indicate that a satisfactory method may be developed for obtaining seed from many stocks that are normally propagated as clonal lines.

The present collection totals more than 2,400 clones and seed lots and includes 56 species, 114 commercial varieties, and numerous species hybrids. Seeds and tubers of the current-year's crop are now available. Shipments were made during the past year to 18 States and 1 territory, and 9 foreign countries: Connecticut, Iowa, Maryland, Michigan, Minnesota, Montana, Nebraska, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, Texas, West Virginia, Wisconsin, Wyoming; Alaska; and Belgium, Bolivia, Brazil, Canada, England, Germany, Indonesia, Mexico, and Netherlands.

Late Blight

Increasing interest has developed in the races of *Phytophthora infestans* and the inter-relationships of these races with genes for resistance to the late blight disease. The laboratories of Scotland, United States,

and Holland have, more-or-less independently, developed a series of late-blight differential hosts. It was suggested by the technical workers that these differential hosts be added to the Inter-regional Potato Collection. Accordingly, the stocks were requested and received. Listed below are the differential hosts which are currently available for distribution of Dr. W. Black, Scotland; Drs. W. R. Mills, Pennsylvania, and L. C. Peterson, New York; and Dr. C. Mastenbroek, Holland. Each stock is identified by the number assigned by the contributor. Plant Inventory numbers have also been assigned but are not listed. The genes for resistance carried by these stocks are identified in like manner.

For more complete information concerning the relationships of the systems used by these workers refer to the summary chart entitled "International System of Designating Inter-relationships of Genes and Races". This is an excerpt chart, slightly modified, taken from an article which will soon appear in Euphytica.

Differential Hosts for Races of Late Blight

W. Black's:

Differential	Genotype	
	Black's System	International System <u>1/</u>
SSRPB 835a(4)	R ₁	R ₁
" 1512c(16)	R ₂	R ₂
" 1253a(12)	R ₃	R ₃
" 1563c(14)	R ₄	R ₄
" 1647b (1)	R ₁ R ₂	R ₁ R ₂
" 1506b (9)	R ₁ R ₄	R ₁ R ₄
" 1682c (1)	R ₂ R ₃	R ₂ R ₃
" 1488b (1)	R ₃ R ₄	R ₃ R ₄

Mills' and Peterson's:

Differential	Genotype	
	Mills' & Peterson's System	International System <u>1/</u>
EXD-3	B	R ₄
3AB-2	C	R ₂
Essex	D	R ₁
TI-5	BC	R ₂ R ₄
3XX-4	BC	R ₂ R ₄
3WM-19	BD	R ₁ R ₄
3XE-1	CD	R ₁ R ₂
3XX-1	BCD	R ₁ R ₂ R ₄
DFR-4	DD	R ₁ R ₁

Differential Hosts for Races of Late Blight (Cont.)

Mastenbroek's:

Differential	Genotype	
	Mastenbroek's System	International System ^{1/}
43154-5	R ₉	R ₁
4431-5	R ₂ R ₅	R ₄
44158-4	R ₇	R ₂
4414-2		R ₂ R ₄
46174-30		R ₁ R ₄
4651-2		R ₁ R ₂
4737-33	R ₈	R ₃
4739-58		R ₁ R ₃

Additional Late-Blight-Resistant Selections

CPC 2127 (S. demissum) - this demissum was used by Dr. W. Black in obtaining the hybrids (differentials) listed above. The genotype of this selection appears to be R₁R₂R₃R₄.

S-74 (S. demissum) - one of the most late-blight resistant demissums in the Rockefeller Foundation Collection in Mexico. Dr. John Niederhauser has recently contributed this stock to the Inter-regional collection. The genotype is not reported.

Both of these demissum selections are being increased and will soon be available.

Local Lesion Hosts for Y-virus and A-virus

Two selections of S. demissum that are useful as local lesion hosts have been received from Dr. George Cockerham of Edinburgh, Scotland. These stocks are now available.

SDYC - local lesions with Y-virus

SDAC - local lesions with A-virus

^{1/} For table showing the international system of designating interrelationships of genes and races of late blight see report from West Virginia.

Supplemental Listing of Available Solanum Introductions

A supplement to the 1952 Seed and Tuber List Solanum species has been prepared and is being distributed to technical workers interested in the breeding improvement of the potato. This supplement lists recently received stocks (late blight differentials, advanced breeding selections, foreign commercial varieties, etc.) that have been increased and are currently available for distribution. Pertinent references concerning these introductions are listed.

Recent Review of Literature on The Cytology and Genetics of Potato

Attention is drawn to an excellent article, containing an extremely comprehensive review of the literature, which appears in the most recent issue of Bibliographia Genetica:

M. S. Swaminathan and H. W. Howard

1953 The cytology and genetics of the potato (Solanum tuberosum) and related wild species.
Biblio. Genetica 16: 1-192.

PACIFIC NORTHWEST
John G. McLean

The 1953 growing season was characterized by extremely cool temperatures in May, warm in July and August, and a long, late fall.

Varieties:

The early variety trials at Parma, and Lewiston, Idaho, are shown in McLean tables 1 and 2. White Rose, DeSota, and Kennebec were again among the highest yielding varieties at both locations. Menominee was second for the yield of U.S. No. 1 tubers at both locations while Russet Burbank was significantly lower than the leading variety in both total yield and yield of U.S. No. 1. Early Gem compared favorably with Bliss Triumph for total yield and yield of U.S. No. 1 potatoes at both places. Considerable loss of yield occurred where Early Gem was planted later in the Lewiston plot.

The effect of the various strains of virus X on Early Gem can be seen in McLean table 1. While there was no significant reduction in total yield, there was a highly significant loss in the yield of U.S. No. 1 potatoes. This was due to the increase in the number of growth-cracked tubers which increased the culls from 4 to 10 sacks per acre and the No. 2's from 39 to 65, 76, and 79 sacks per acre with the increasing severity of the strain of the X virus.

McLean table 1. Yield and quality of potato varieties at Parma, Idaho.
Bullard and McLean

Variety	Total yield ^{1/}	U.S. No. 1	Total solids
	Sx./A	Sx./A	Pct.
White Rose	446	347	25.5
Kennebec	406	345	24.5
DeSota	400	360	23.7
Menominee	381	349	26.3
Russet Burbank	313	224	25.2
B 579-3	264	246	25.2
Red Warba	250	188	23.9
Triumph	209	164	21.6
Early Gem, X-free	239	195	21.9
Early Gem, mild-X ^{2/}	226	151	21.9
Early Gem, common-X ^{2/}	238	151	21.9
Early Gem, Severe-X ^{2/}	235	146	21.9
L.S.D. at .05	27	14	2.2

^{1/} Average of 12 replications in a 12 x 12 latin square

^{2/} Previously plug-grafted with X-virus strains supplied by E.S. Schultz.

McLean table 2. Yield and quality of potato varieties at Lewiston, Idaho.
Woodbury and McLean.

Variety	Total yield ^{1/}	U.S. No. 1	Total solids
	Sx./A	Sx./A	Pct.
White Rose	548	442	23.0
Menominee	523	440	21.7
Kennebec	456	333	20.7
Katahdin	430	369	22.5
DeSoto	426	317	22.2
Russet Burbank	409	293	20.4
Red Warba	337	277	21.9
First planting			
Early Gem	276	208	21.5
Bliss Triumph	260	137	20.9
Second planting			
Early Gem	211	161	21.8
L.S.D. at .05	103.2	120.8	N.S.

^{1/} Average of 4 replications.

The results of the variety trials in 1952 and 1953 at Aberdeen are shown in McLean tables 3 and 4. Many high-yielding varieties, such as Green Mountain and Mohawk, cannot be grown successfully because of the prevalence of potato scab. Over a period of years, the Menominee variety has outyielded the Russet Burbank and produced more No. 1 tubers with equal or higher specific gravity, but it is not grown commercially.

The early variety trial conducted in 1953 included Kennebec and Russet Burbank for comparison. Progress produced a high yield of No. 1 potatoes. This variety has previously been difficult to grow. Early Gem was equal to the Russet Burbank in the field of No. 1 tubers, although it showed less total yield and a much lower specific gravity. White Rose was the highest-yielding variety of this group.

Verticillium Wilt:

The symptoms of wilt were slow in their appearance and advancement because of the cool temperatures in the early part of the growing season. The severity of symptoms increased rapidly during the period August 20 to August 28, which followed a period of high temperatures. Growth of the plants and development of symptoms were further delayed at Rexburg (tables 5 and 6) because of a frost when the plants were 4 to 6 inches high. Verticillium again appeared to affect the yield. Correlation in the variety trial gave a value of -0.650 and in eighty-five 5-hill samples a value of -0.485, both being highly significant. A101-17 and A102-50 are both russet types

under test for resistance. Neither appeared satisfactory this season.

McLean table 3. Yield and quality of potato varieties at Aberdeen, Idaho in 1952 and 1953. Sparks and McLean.

Variety	1952			1953		
	Total	U.S.	Total solids	Total	U.S.	Rank
	yield	No. 1		yield	No. 1	
	Sx./A	Sx./A	Pct.	Sx./A	Sx./A	
Gr. Mountain	289	231	23.4			
Menominee	284	264	22.9	317	238	1
White Rose	250	175	19.4			
Cayuga	243	201	23.7	282	206	5
G.S. 6330	241	213	20.9	315	223	2
Mohawk	228	213	23.7			
Ontario	206	196	21.1	241	158	6
Rus. Burbank	194	125	19.9	291	112	4
Yampa	177	164	21.6	202	116	7
Early Gem	167	123	17.4			
Kennebec				295	169	3
L.S.D. at .05	11.7	10.5	1.3	52.7	46.9	

1/ Average of 6 replications.

2/ Average of 7 replications from a 7 x 7 latin square.

McLean table 4. Yield and quality of early potato varieties at Aberdeen, Idaho, in 1953. Sparks and McLean.

Variety	Total Yield	U.S. No. 1	Total solids
	Sx./A	Sx./A	Pct.
White Rose	310	183	21.2
Progress	292	195	20.0
Russet Burbank	280	143	23.0
Kennebec	257	190	21.9
Early Gem	243	144	18.6
Red Warba	196	53	19.4
Bliss Triumph	182	113	18.1
L.S.D. at .05	23.2	14.7	1.2

1/ Average of 7 replications from a 7 x 7 latin square.

The effect of the age of the seed on Verticillium infection and yield on 6 varieties is shown in McLean table 6. Previous tests had shown that younger seed was responsible for a considerable reduction in symptoms.

Seed tubers of the same lots were planted in the field in May, some of which had been planted the previous May (12 months), others were from November planting in the greenhouse (6 months). In the susceptible varieties the index of Verticillium was reduced from an average of 34.2 to 3.7. Corresponding yield increases, however, did not occur in all varieties. The younger seed increased the yield with Russet Burbank and Green Mountain but the rest period of Early Gem and Kennebec was not sufficiently broken by the ethylene chlorohydrin treatment to allow mature plants to be produced during the growing season. The younger seed in the Menominee variety also produced immature plants whereas little difference could be found with the seed age on the appearance of the plants of 41956.

McLean table 5. Yield, quality and verticillium index of potato varieties at Rexburg, Idaho. McLean.

Variety	Total ^{1/} yield	U.S. No. 1	Verticillium index	Total solids
	Sx./A	Sx./A		Pct.
Ac 25669	354	259	3.0	20.8
Al01-17	348	303	3.5	20.9
Russet Sebago	261	204	4.0	20.2
41956	255	171	5.7	19.4
Menominee	223	200	4.0	20.6
Russet Burbank	218	145	40.5	20.1
Al02-50	217	113	15.7	19.9
CS6330	189	141	21.0	20.6
Bliss Triumph	116	36	75.0	18.9
L.S.D. at .05	88.6	85.0	21.3	N.S.

^{1/} Average of 3 replications.

Readings on family lines at Rexburg indicated that the strong correlation between late maturity and verticillium resistance has been broken.

McLean table 6. The effect of the age of seed on verticillium wilt and yield at Rexburg, Idaho. McLean.

Variety	Age of seed tubers	Index of verticillium infection				Average index	Yield of 5 hills
		Aug. 6	Aug. 20	Aug. 28	Sept. 2		
	Months						Lbs.
Rus. Burbank	12	2.0	8.0	45.0	50.0	26.3	6.5
" "	6	.0	.0	5.0	5.0	2.5	9.5
Early Gem	12	6.0	18.0	42.0	65.0	32.8	8.7
" "	6	.0	.0	.0	.0	.0	4.6
Kennebec	12	.0	27.0	63.0	73.0	40.8	7.2
" "	6	.0	1.0	10.0	20.0	7.8	5.3
Gr. Mountain	12	5.0	32.0	40.0	70.0	36.8	8.2
" "	6	.0	.0	5.0	10.0	3.8	9.5
Menominee	12	.0	.0	.0	7.0	1.8	10.0
" "	6	.0	.0	.0	.0	.0	3.1
41956	12	.0	.0	.0	5.0	1.3	12.6
" "	6	.0	.0	.0	.0	.0	9.1

Scab:

Severe scab was found in the plots at Aberdeen this season. Type 2 pustules were produced on Russet Burbank and Menominee. The ferric chloride method of determining scab resistance (Johnson and Schaal, Sci. 115: 627-629. 1952) was used on 208 lines and compared with scab readings. When the zero values were replaced by 0.1 a highly significant correlation of -0.678 was obtained. It appeared that a few scab-resistant lines gave a higher ferric chloride reading than the standard resistant varieties. Several lines that gave a reaction to ferric chloride were not scab-resistant.

Leafroll:

Severe leafroll spread was again found in the Parma trial. Two lines, B 2361-2 and B 2958-2, have withstood 2 years at Parma and have been saved for further testing and breeding work.

NORTH CENTRAL REGIONAL POTATO TRIALS 1953
C. E. Peterson and Cooperators
(See North Central Table 1)

The cooperative potato-testing program in the North Central region was carried on for the third year in 1953. Among the few modifications made was the addition of South Dakota making a total of 9 states participating and the addition of a second location in Nebraska making a total of 10 trials. Entries included 16 numbered selections and the varieties Pungo, Manota, Early Gem, Redkote, Osage, and Cherokee, along with the 3 check varieties, Cobbler, Triumph, and Katahdin. The trials were modified in design by dividing entries into 2 groups according to season of maturity. An effort was made to place those entries in maturity classes 1 and 2 (Cobbler maturity and earlier) in group A, and those in class 3, 4, and 5 (Pontiac maturity and later) in group B. It was thought that some of the variability in competition between late and early varieties could be avoided. This effort was only partially successful as you can see in North Central table 3.

We also tried to establish a uniform procedure for reporting external and internal defects. The table adopted for this purpose proved unsuitable to the methods employed by some but in most cases it was adopted and it provided some information of sufficient uniformity to simplify the task of interpreting the data.

Our experience has demonstrated that in this type of trial the methods used are not nearly as important as achieving uniformity of methods. Those who have cooperated in these trials for the past 3 years have been willing to follow certain procedures agreed upon by the committee and as a result the task of summarizing the data and making some interpretations of it has been greatly simplified.

Pertinent general information on the plots at each location is shown in North Central table 1. The area over which these trials are conducted represents a wide variety of environmental conditions. Under such conditions it would be surprising indeed to find a selection that performs well at all locations. One of the greatest values of trials such as these is their ability to detect qualitative weakness or merits. Defects such as growth cracks, second growth, hollow heart, internal necrosis etc., are more likely to be revealed by 1 year's trial in the 10 locations used in 1953 than they would be in several years of testing at 1 location. That is why we have developed the uniform summary sheet for grade defects.

Reports on the replicated trials were received from each of the 10 locations and data were forwarded to E. J. Koch, Biometrician, Horticultural Crops Research Branch, Beltsville, Md., for analysis.^{1/} Data on yields of U.S. No. 1 potatoes and specific gravity were analyzed and the results are recorded in table 1. After analyses were completed the mean specific gravity

^{1/} The prompt and thorough job performed by Mr. Koch in completing these analyses is gratefully acknowledged.

North Central table 1. North Central regional potato trials, 1953.

Kansas		North Dakota	
Cooperator	James Greig	J. H. Schultz	
Location	Manhattan	Grand Forks	
Soil Type	Deep Silt Loam	Bearden Clay Loam	
Fertilizer	300#/A 10-20-0	200#/A 0-30-15	
Spacing	36" x 12"	38" x 14"	
Date Planted	March 23	May 27	
Date Harvested	August 6	Sept. 26	
Remarks	Irrigated as needed, some frost damage May 13. Yields and quality generally low due to abnormally high temperature.	Moisture plentiful except two weeks in August. 20-30% defoliation by hail July 22. Some water damage in Reps. I and II.	
South Dakota		Iowa	
Cooperator	A. A. Cook	A. E. Schark	
Location	Brookings	Clear Lake	
Soil Type	Barnes Loam	Muck	
Fertilizer	None	700#/A 0-9-27	
Spacing	42" x 12"	36" x 12"	
Date Planted	May 13-14	May 12	
Date Harvested	Sept. 28 - Oct. 2	Sept. 17	
Remarks	Excessive rain late July and early August; below normal thereafter.	Hot and dry during August. Killing frost Sept. 10. Yield and quality unusually low.	
Minnesota		Wisconsin	
Cooperator	F. A. Krantz	G. H. Rieman	
Location	Duluth	Rhineland	
Soil Type	Clay Loam	Sandy Loam	
Fertilizer		600#/A 6-6-18 bdcst. 800#/A 3-12-12 row	
Spacing	36" x 18"	36" x 12"	
Date Planted	May 25	May 12	
Date Harvested	Sept. 18	Sept. 11	
Remarks	Excessive rain in July and early Aug. Water damage in all blocks. Killing frost Sept. 12. Plot yields estimated on basis of 5-hill samples.	Growing conditions normal for area. No appreciable disease or insect damage.	

North Central table 1 continued.

	Indiana	Michigan
Cooperator	N. K. Ellis	N. R. Thompson
Location	Walkerton	Lake City
Soil Type	Muck	Iesco Sandy Loam
Fertilizer	1100#/A 3-9-27	800#/A 3-12-12
Spacing	36" x 12"	36" x 11"
Date Planted	May 6	May 16
Date Harvested	Sept. 22	Sept. 29
Remarks	Growing conditions normal.	Irrigated. Temperatures above normal. Vines killed with dinitro spray Sept. 10.
	Nebraska	Nebraska
Cooperator	H. O. Werner	H. O. Werner
Location	Mitchell	Cezad
Soil Type	Fine Sandy Loam	Hall Silt Loam
Fertilizer	60# N Applied to sod	300#/A 8-32-8 and 20 T. manure
Spacing		36" x 12"
Date Planted	June 15	April 14
Date Harvested	Oct. 9	August 26
Remarks	Irrigated as needed. Hail and wind damage August 10.	Irrigated 11 times. Rainfall below normal. DDT dust 5% 4 applications for insect control.

values were converted to the total solids percentages shown in the table.

In North Central table 2 it will be noted that the entries are divided into the early group (A), entries 1-14, and the late group (B), entries 15-25. Least significant differences have been computed for each group and these should be used in comparing the entries with the appropriate check varieties. As stated before, the effort to classify varieties fell somewhat short of the accuracy intended. However, it will be noted in North Central table 3 that maturity classes 1, 2, and 3 are quite generally confined to group A and classes 4 and 5 to group B. The most unsatisfactory division of varieties was apparent in Wisconsin where many entries in the late group (B) fell into maturity classes comparable with those in group A.

At Manhattan, Kan., among the entries in group A, only Mich. 1363 (No. 14) produced a yield of U.S. No. 1 tubers that was significantly higher than Triumph, (North Central table 2). The most serious grade defect noted in Michigan 1363 was scab. The new variety Manota produced a low yield and low percentage of U.S. No. 1 tubers. Most of the grade defects were second growth. Early Gem also gave a low yield with a high percentage of defects due to second growth. None of the entries in group B produced yields significantly higher than Katahdin. Osage and Cherokee were significantly lower in yield than Katahdin. The low percentage of U.S. No. 1 tubers of Osage seemed to be due to scab. Note that Osage at Kansas had a scab reading of 3-4 (North Central table 3) compared with rather resistant readings at all other locations. Osage also had 25% hollow heart in the Kansas trial. Cherokee produced a surprisingly high percentage of scab defects and a scab reading of 2-3 which was relatively high compared with other locations. (North Central table 3) The severe scab in Kansas may be accounted for because the soil had a pH. of 7.6 and the season was extremely hot and dry. According to the Kansas data there was also a relatively high percentage of grade defects due to second growth in most entries in group A and Cherokee in group B.

None of the varieties in group A at Grand Forks, N. Dak., were significantly higher in yield than Cobbler. Among the three new varieties, Pungo yielded about the same as Cobbler; Manota and Early Gem were both lower in yield than Cobbler by highly significant differences. Manota did not have any serious proportion of grade defects although the scab reading of 3-4 in North Central table 3 indicates scab susceptibility comparable to Cobbler. Total solids in Manota (19.2%) was not significantly lower than that of Cobbler, (19.9%). Early Gem had a total solids content of 16.9%, the lowest in the N. Dakota trial. Wis. M804, ND457-1, and Redkote all outyielded Katahdin at North Dakota by odds greater than 99:1. Cherokee yielded more than Katahdin by odds of 19:1, (227 bushels compared with 130 for Katahdin). Compared with Katahdin, Wis. M804 had a significantly higher percentage of total solids. Its defects were 7% hollow heart and 6% internal necrosis. ND457-1 was among the most outstanding in appearance and it produced the highest total solids (20.2% compared with 17.9% for Katahdin). Its external defects were few but it had 17% hollow heart and 17% internal necrosis. No serious grade defects were reported in Cherokee and its total solids content, 19.1% was significantly higher than Katahdin.

North Central table 2. Yield per acre and percentage of U.S. No. 1 tubers and total solids content of entries in North Central regional trials, 1953.

Entry No.	Variety or selection	Kansas			North Dakota		
		Yield per A.		Specific gravity	Yield per A		Total solids
		U.S. No. 1			U.S. No. 1		
		Bu.	Pct.		Bu.	Pct.	Pct.
1	Cobbler ck.	125	35.3	1.090	341	92.1	19.9
2	Triumph ck.	150	50.5	1.022	273	91.2	17.4
3	Neb. 89.46-2	60	49.0	0.987	158	89.9	17.9
4	" 26.44-1	102	41.1	1.027	332	93.7	19.8
5	" 127.46-1	91	71.1	1.053	260	96.8	18.1
6	Min. 358	94	40.9	1.034	239	92.0	20.3
7	" 24	111	40.0	1.037	243	96.4	18.7
8	Kan. Pungo	91	39.2	1.016	338	97.7	19.7
9	" B 69-16	106	58.7	1.049	344	96.6	19.4
10	" B 606-67	58	21.8	1.005	328	91.2	20.0
11	N.D. Manota	57	26.6	1.009	255	91.3	19.2
12	" Early Gem	55	25.8	0.996	251	81.5	16.9
13	Wis. 27.50	154	67.3	1.025	230	95.0	18.4
14	Mich. 1363	250	73.7	1.042	283	93.4	17.4
L.S.D. Group A		P = .05	46		62		0.8
		P = .01	62		83		1.1
C.V.			30%		16%		2.9%
15	Katahdin ck.	158	68.0	1.029	130	94.5	17.9
16	Wis. 1301	145	56.3	1.061	167	89.9	18.2
17	" M804	154	70.2	1.075	270	96.6	19.4
18	Min. 44-2	172	69.5	1.061	192	90.8	19.2
19	N. D. 457-1	116	45.8	1.041	272	92.0	20.2
20	" Redkote	152	54.2	1.071	272	92.1	18.1
21	Ia. Osage	80	55.9	1.095	175	87.6	19.8
22	" Cherokee	68	24.8	1.076	227	91.7	19.1
23	" X26-8						
24	Mich. R77-29	145	74.1	1.064	109	86.2	16.2
25	" BP 46-4			1.083	116	83.5	18.3
L.S.D. Group B		P = .05	63		97		1.2
		P = .01	93		131		1.6
C. V.			37%		35%		4.2%

North Central table 2 continued

Entry No.	Variety or selection	South Dakota			Iowa		
		Yield per A.		Total solids	Yield per A.		Total solids
		U.S. No. 1			U.S. No. 1		
		Bu.	Pct.	Pct.	Bu.	Pct.	Pct.
1	Cobbler ck.	221	75.0	16.5	243	68.8	17.7
2	Triumph ck.	155	73.9	14.3	187	67.1	15.0
3	Neb. 89.46-2	166	85.9	14.5	40	59.9	15.6
4	" 26.44-1	219	83.9	16.9	234	76.0	17.4
5	" 127.46-1	283	84.5	16.7	199	67.3	17.6
6	Min. 358	194	75.7	17.9	174	62.5	18.4
7	" 24				201	44.3	16.5
8	Kan. Pungo	235	79.9	15.2	326	87.3	18.4
9	" B 69-16				107	72.4	17.9
10	" B 606-67	225	51.1	18.4	257	68.7	17.6
11	N. D. Manota	91	60.6	15.8	180	54.7	16.3
12	N. D. Early Gem	114	51.0	14.1	81	66.7	13.5
13	Wis. 27.50	177	92.3	16.9	185	83.4	16.7
14	Mich. 1363	134	71.5	15.4	311	80.2	16.3
L.S.D. Group A P = .05		49		1.2	79		0.8
P = .01		66		1.6	105		1.1
C. V.		22%		5.3	32%		4.0%
15	Katahdin ck.	167	72.0	15.8	238	75.5	17.7
16	Wis. 1301	143	77.6	16.7	221	73.1	17.4
17	" M804	176	82.2	18.2	186	80.2	17.8
18	Min. 44-2				98	60.3	17.9
19	N.D. 457-1	210	72.4	17.2	278	70.4	18.2
20	" Redkote	219	84.7	14.3	321	79.3	16.3
21	Ia. Osage	79	85.3	15.8	243	81.1	17.7
22	" Cherokee	221	70.2	18.2	190	75.3	18.6
23	" X26-8	131	75.0	16.9	191	65.7	17.4
24	Mich. R77-29	126	61.7	14.5	111	69.0	15.6
25	" BP 46-4	160	61.3	19.1	103	63.2	18.6
L.S.D. Group B P = .05		58		1.3	71		0.7
P = .01		78		1.8	95		1.0
C. V.		30%		5.3%	28%		3.5%

North Central table 2 continued.

Entry No.	Variety or selection	Minnesota			Wisconsin		
		Yield per A.		Total solids	Yield per A.		Total solids
		U.S. No. 1			U.S. No. 1		
		Bu.	Pct.	Pct.	Bu.	Pct.	Pct.
1	Cobbler ck.	97	81.6	21.9	554	92.7	21.2
2	Triumph ck.	108	75.6	18.2	565	94.7	19.4
3	Neb. 89.46-1	59	77.8	18.7	328	91.2	18.4
4	" 26.44-1	124	88.1	20.5	580	96.2	22.1
5	" 127.46-1	127	82.4	21.4	459	95.2	20.7
6	Min. 358	101	78.5	23.9	427	91.4	23.2
7	" 24	101	74.8	17.4	474	94.2	20.4
8	Kan. Pungo	85	75.9	21.4	497	96.7	21.4
9	Kan. B 69-16	138	89.9	21.4	506	96.7	22.1
10	" B 606-67	88	85.6	20.4	603	96.7	22.4
11	N. D. Manota	106	81.6	18.2	471	89.6	20.4
12	" Early Gem	108	88.0	18.6	511	92.1	18.9
13	Wis. 27.50	85	74.4	19.9	434	92.5	19.7
14	Mich. 1363	70	73.2	17.2	415	92.4	19.4
L.S.D. Group A		P = .05	48	1.1	49		0.9
		P = .01	64	1.6	65		1.1
C.V.			38%	3.0%	7%		3.3%
15	Katahdin ck.	83	92.1	18.9	364	94.1	20.9
16	Wis. 1301	25	55.1	18.2	427	91.0	20.2
17	" M804	124	83.1	23.6	311	91.4	20.9
18	Min. 44-2	147	81.4	20.6	82	86.1	20.4
19	N. D. 457-1	109	76.5	21.7	282	86.6	21.4
20	" Redkote	110	81.3	19.4	384	88.5	20.5
21	Ia. Osage	105	86.2	20.9	266	93.2	21.2
22	" Cherokee	64	76.2	18.4	391	91.5	22.4
23	" X26-8						
24	Mich. R77-29	54	64.6	18.0	286	83.7	18.4
25	" BP 46-4	63	60.2	22.2	276	83.8	20.8
L.S.D. Group B		P = .05	59	2.6	58		1.0
		P = .01	79	3.8	78		1.4
C.V.			52%	6.4%	13%		3.9%

North Central table 2 continued

Entry No.	Variety or selection	Indiana			Michigan		
		Yield per A. U.S. No. 1		Total 1/ solids	Yield per A. U.S. No. 1		Total solids
		Bu.	Pct.	Pct.	Bu.	Pct.	Pct.
1	Cobbler ck.			19.7	290	83.5	20.1
2	Triumph ck.	18	25	16.0	332	86.7	17.6
3	Neb. 89.46-1	94	47	16.7	250	84.6	17.4
4	" 26.44-1	333	50	16.0	325	92.5	20.9
5	" 127.46.1	172	32	18.4	440	96.5	19.8
6	Min. 358	261	37	21.7	223	81.6	21.2
7	" 24	200	32	16.7	289	87.6	18.9
8	Kan. Pungo	448	52	20.7	293	94.9	20.4
9	" B 69-16	440	57	18.4	408	94.2	20.4
10	" B 606-67	264	27	20.7	467	96.4	20.4
11	N.D. Manota	319	60	18.4	283	87.9	19.8
12	" Early Gem	209	47	16.0	297	84.6	18.4
13	Wis. 27.50	368	60	16.7	221	91.5	18.9
14	Mich. 1363	344	65	17.7	375	90.9	17.6
L.S.D. Group A P = .05		125			90		1.2
P = .01		166			120		1.6
C.V.		14%			20%		5.1%
15	Katahdin ck.	172	35	17.7	404	94.1	19.4
16	Wis. 1301	163	42	17.7	273	89.2	19.4
17	" M804	420	69	18.9	366	87.9	20.1
18	Min. 44-2	322	60	19.7	144	94.0	19.7
19	N.D. 457-1	304	55	18.4	478	93.4	19.9
20	" Redkote	413	50	18.7	326	88.8	17.6
21	Ia. Osage	285	72	16.7	236	96.5	20.4
22	" Cherokee	362	74	18.4	327	94.6	19.1
23	" X26-8	479	90	18.9			
24	Mich. R77-29	120	35	18.7	132	92.6	18.9
25	" BP 46-4	258	60	20.4	347	92.9	21.5
L.S.D. Group B P = .05		146			133		1.8
P = .01		197			180		2.4
C.V.		20%			30.2%		7.3%

1/ Based upon only one replication.

North Central table 2 continued

Entry No.	Variety or selection	Nebraska (Mitchell)			Nebraska (Cezad)		
		Yield per A.		Total solids	Yield per A.		Total solids
		U. S. No. 1			U.S. No. 1		
		Bu.	Pct.	Pct.	Bu.	Pct.	Pct.
1	Cobbler ck.	202	41.9	20.4	351	66.3	13.8
2	Triumph ck.	222	43.2	17.9	355	64.8	14.3
3	Neb. 89.46-2	186	60.0	18.9	95	65.3	17.7
4	" 26.44-1	307	84.9	20.4	209	76.4	16.5
5	" 127.46-1	311	72.4	19.8	241	79.6	15.0
6	Min. 358	290	71.1	23.0	178	68.6	16.9
7	" 24	147	36.0	18.6	153	69.4	21.2
8	Kan. Pungo	344	74.2	21.3			
9	" B 69-16	296	61.6	21.7			
10	" B 606-67	247	42.2	22.7			
11	N.D. Manota	303	69.7	18.5	308	82.5	16.5
12	" Early Gem	161	34.5	18.9	97	30.8	14.0
13	Wis. 27.50	269	69.7	20.4	258	82.2	15.5
14	Mich. 1363	220	55.9	18.7	428	77.9	14.3

L.S.D. Group A P = .05

P = .01

C.V.

15	Katahdin ck.	316	78.6	19.9	163	81.1	14.7
16	Wis. 1301	335	77.3	20.7	238	78.7	14.2
17	" M804	240	80.2	23.1	104	68.2	16.1
18	Min. 44-2	217	75.0	23.2			
19	N.D. 457-1	280	72.1	22.2	244	84.4	18.2
20	" Redkote	333	83.8	20.6	131	71.9	14.0
21	Ia. Osage	219	74.6	21.6	98	77.9	18.5
22	" Cherokee	233	67.3	21.2	166	66.3	16.2
23	" X26-8	126*	65.6	18.9			
24	Mich. R77-29	202	76.8	19.4			
25	" BP 46-4	125	73.1	21.9			

L.S.D. Group B P = .05

P = .01

C.V.

*Progress substituted for X26-8

North Central table 3. Maturity and scab notes on entries in North Central regional trials, 1953.

Entry No.	Variety or selection	Maturity Notes <u>1/</u>				Scab Readings <u>3/</u>						
		Kan.	N.D.	Wisc.	Mich. <u>2/</u>	Kan. <u>4/</u>	N.D.	Iowa	Wis. <u>5/</u>	Ind.	Mich.	Min. <u>6/</u>
1	Cobbler ck.	2.0	2.0	2	2.0	1-2	3-4	2-4	3-3	3-4	5-5	
2	Triumph ck.	1.0	1.5	2	1.5	1-2	3-4	2-4	4-4	3-4	5-5	
3	Web. 89.46-2	1.2	2.0	2	2.2	2-3	1-4	1-2	3-4	2-3	3-1	
4	" 26.44-1	1.5	3.0	3	3.0	1-3	3-4	1-4	3-4	2-4	3-5	
5	" 127.46-1	2.2	3.0	3	2.7	1-1	3-4	2-4	4-4	2-4	1-5	2
6	Min. 358	2.0	2.7	2	2.7	1-2	3-3	1-4	4-4	2-4	5-5	
7	" 24	2.0	2.2	2	2.7	2-4	3-3	2-4	4-4	3-4	5-5	3
8	Kan. Pungo	3.2	3.0	3	3.0	2-4	2-2	1-3	2-3	2-2	1-1	4
9	" B 69-16	2.7	3.0	4	3.2	2-3	2-4	1-4	2-3	2-4	5-5	5
10	" B 606-67	3.5	3.0	3	3.7	1-2	2-4	1-4	3-3	2-4	3-5	1
11	N.D. Manota	1.7	2.0	2	2.7	1-1	3-4	2-4	1-3	2-4	1-1	3
12	N.D. Early Gem	1.2	2.2	1	2.2	1-4			T-1			
13	Wis. 27.50	2.7	2.7	2	2.5	1-1	1-1	1-4	2-2	1-4	1-1	
14	Mich. 1363	2.7	2.2	3	2.2	2-4	1-1	1-3	2-2	2-4	1-1	
15	Katahdin ck	5.0	4.0	3	4.0	1-2	2-4	1-4	2-3	2-4	3-5	
16	Wis. 1301	2.5	3.0	3	3.2	1-3	2-2	1-4	2-2	2-4	2-5	2
17	" M804	4.7	4.7	4	4.5	1-2		1-1	1-1			
18	Min. 44-2	4.2	4.2		4.2	1-1	1-2	1-3			1-5	2
19	N.D. 457-1	4.2	4.0	3	4.2	1-1		1-4	T-1	2-4	1-1	5
20	" Redkote	4.0	4.0	3	4.0	3-2	1-2	1-3	1-2	3-3	3-1	2
21	Ia. Osage	4.7	3.7	3	3.7	3-4		1-1	1-2	2-2		
22	" Cherokee	3.5	3.0	3	3.2	2-3		T-1	1-2	T-1	2-3	
23	" X26-8							2-2				
24	Mich. R77-29	4.0	3.5	3	5.0	2-3	3-1	1-3	1-2	2-3	2-3	2
25	" BP 46-4	5.0	4.7	3	5.0	1-1		1-3	2-2	T-2	1-2	2

1/ Average of 4 readings - 1 = earlier than Cobbler; 2 = Cobbler maturity;
3 = later than Cobbler but earlier than Katahdin;
4 = Katahdin maturity; 5 = later than Katahdin.

2/ Michigan readings based on one replication.

3/ First figure indicates area, T = trace, 1 = 1-20% surface covered, 2 = 21-40%,
3 = 41-60%, 4 = 61-80%, 5 = more than 80% of surface area covered.

Second figure indicates type of scab lesion, 1 = surface (russet) type, 2 = raised surface or shallow pit, 3 = pitted scab, 4 = deep pits, 5 = very deep pits. In most cases readings were made for all reps. and most severe reading is recorded above.

4/ Based on readings on one replication.

5/ Based on 5-hill sample grown in separate scab plots at Antigo, Wis.

6/ Based on sample from separate scab plots at Grand Rapids, Minnesota. Type of lesion only is indicated.

At Brookings, S. Dak., only entry No. 5 (Neb. 127.46-1) yielded significantly more potatoes than Cobbler. This entry did not have many serious external defects but it produced 24% hollow heart. Manota and Early Gem both yielded significantly less than Cobbler (see North Central table 2). Manota had 21.8% of grade defects due to scab and Early Gem produced 38% of growth cracks. In total solids Manota is not significantly lower than Cobbler but Early Gem is lower by a highly significant margin (14.1% compared with 16.5% for Cobbler).

In group B at Brookings S. Dak., no entries yielded significantly more than Katahdin although Cherokee, Redkote, and ND457-1 came close to it. Osage with a yield of 79 bushels is the only entry in group B that is significantly below Katahdin.

At Brookings this was a good year for the development of hollow heart. Following are the entries that developed serious amounts of hollow heart: Cobbler, 35%; Nebraska 127.46-1, 24%; Min. 24, 28%; Pungo, 43%; Katahdin, 22%; Wis. 804, 21% ND457-1, 50% Osage, 32%; and Mich. R 77.29, 30%. Internal necrosis also was present in tubers from the South Dakota trial. Neb. 89.46-2 had 16%; Wis. 27.50, 8%; Wis. M804, 24%, ND457-1, 17%; and Mich. BP 46-4, 13%.

At Clear Lake, Iowa, Pungo was the only entry in group A with a higher yield than Cobbler. Mich. 1363 closely followed Pungo and its advantage over Cobbler was just shy of significance. Pungo produced 26% hollow heart. This defect was negligible in all other entries except in Mich. BP 46-4 (No. 25) with 14% and Osage (No. 21) with 11%. More complete data on performance and defects of the regional entries in Iowa can be found in Iowa tables 4 and 5. Early Gem produced the lowest yield of all named varieties and the lowest percentage of total solids in the trial. Manota was the most severely scabbed of all the entries. In group B it should be noted that Redkote alone produced a yield of U.S. No. 1 potatoes significantly higher than Katahdin. This variety also looked promising in Iowa in 1952 and it seems worthy of serious consideration for commercial production. Unfortunately, it is not high in total solids (16.3% compared with 17.7% in Katahdin and Cobbler). Observations on internal necrosis (Iowa table 5) agree quite well with those made in South Dakota. Two of the varieties that showed this defect there, Wis. M804 and ND457-1, had 20% and 27%, respectively, of internal necrosis in Iowa.

Yields at Duluth, Minn., were extremely low and variable. No variety in group A yielded significantly more than Cobbler. Entry No. 9, B 69-16 was the highest yielding in the group. Min. 44-2 was the only one of the entries in group B that yielded more than Katahdin. In the summary of defects the selection Min. 44-2 was reported to have 20.4% sun greening and 6% hollow heart. It was also noted that Redkote produced 18% hollow heart the highest in the Duluth trial and Osage produced only 2%.

At Rhinelander, Wis., the yields were high and variability in the trial was unusually low. B 606-67, entry #10 from Kansas, was the only one in Group A that produced a yield significantly higher than Cobbler. This selection was also relatively free from external and internal defects in the replicated

plots at Rhinelander. In the scab plots at Antigo the reading 3-3 was the same as that for Cobbler. Several of the entries in group A yielded significantly below Cobbler. Among these ^{were} Manota and Pungo. Early Gem produced better yields here than in most other locations and the growth cracks and second growth reported in Early Gem from some other locations were not serious at Rhinelander. In the later group B only Wis. 1301 produced a yield of U.S. No. 1 tubers significantly higher than Katahdin. This is a very attractive red selection. In some trials Wis. 1301 was quite susceptible to scab but at North Dakota and Wisconsin it did not scab as severely as Cobbler.

At Walkerton, Ind., Cobbler produced no U.S. No. 1 potatoes and Triumph produced only 2.5%. Scab was severe and most of the culls were due to scab. Pungo produced the highest yield in group A and B 62-16 was a close contender. Manota did better here than at most other locations. The scab reading of 2-4 for Manota (North Central table 3) indicates susceptibility comparable to Cobbler but the percentage of culls due to scab was not determined. In group B Ia, X26-8 was the highest yielding followed by Wis. M804, and Redkote. All three of these ^{were} higher yielding than Katahdin by odds of 99:1. Cherokee and Min. 11-2 were also significantly higher in yield than Katahdin.

At Lake City, Mich., in group A, B 606-67 and Neb. 127.46-1 outyielded Cobbler by highly significant margins. B 62-16 also yielded significantly more than Cobbler. In group B only ND457-1 yielded more than Katahdin. Osage yielded significantly less than Katahdin. The most serious defects in Osage were 21% sun greening and 4% hollow heart. Here again ND 457-1 showed a tendency to develop hollow heart (11%) and internal necrosis (14%). These same two defects were evident in Wis. M804 (11% and 12%, respectively).

Dr. H. O. Werner of Nebraska submitted the following comments regarding his impressions of certain of the entries in the Nebraska trials: "Neb. 29.46-2 produces excellent, long red tubers. It appears to have vines too weak for satisfactory commercial yields unless heavily fertilized and adequately irrigated. Neb. 127.46-1 produces tubers of excellent type but they are too light in color for the preference of most people. The vines have a tendency to roll in a manner that complicates leafroll diagnosis. Yields are fairly satisfactory. Both the 2 previous varieties are Pawnee progenies. We do not consider either suitable for introduction. Neb. 26.44-1 is a very promising red that has tubers high in specific gravity. It is being increased with a view to introduction about 1955. Wisconsin M804 was among the best in tuber type in the Nebraska trials but yields seem too low. N.D. Manota produced good yields of good type tubers. Early Gem tubers were too rough and too low in specific gravity for serious consideration in the Nebraska location. Redkote may be suitable in late areas but seems unsuited to the warm, early area in Nebraska."

Again this year the data from each location were summarized in detail and extra copies prepared and distributed to all members of the committee. By this means material is provided so that each cooperator can make a detailed study of the entries in which he is particularly interested.

COLORADO (Fort Collins)

Lawrence A. Schaal, Cecil W. Frutchey, Charles W. McAnelly

The cooperative potato-breeding testing program was continued along the lines of previous years. All crosses were made by W. C. Edmundson at the Greeley, Colo., Station. Approximately 750 5-hill lots were grown in the field at Greeley, and selections from these will be included in the 1954 test plots. From 1952 5-hill lots 115 selections were included in 2 scab plots and an adaptability test plot and a 32-hill increase plot on the Greeley Station farm. The 32-hill plot and the adaptability test plots were rogued, and seed from these plots will serve for further tests.

Large lots of older seedlings were grown in plots at Eaton, Colo., in the San Luis Valley, and at Fort Collins, Colo. Part of the funds for the test plots at Fort Collins and Eaton was furnished by the Area 3 PMA.

Scab Test Plots

The 115 selections included in the scab test plots were from 19 family lines (Schaal table 1). The physiologic races of Streptomyces scabies present in these 2 plots differ greatly. The races present in the soil at Woody Creek are more virulent and more numerous. The pustule type produced in the soil at Gilcrest is typical of that found in the potato fields of northern Colorado. Scab infection was moderately heavy at Gilcrest, Colo., and very heavy at Woody Creek, Colo. Several lots appeared to have promise in the plot at Gilcrest. Very few were sufficiently resistant to the scab races at Woody Creek to permit growing there. CS 12,240 was found to be practically free from scab in both plots. This selection was also grown at Eaton, Colo., and on the Station farm at Greeley, and was outstanding in all places. Schaal table 2 shows the selections that appeared to have promise in the plot at Gilcrest, Woody Creek, and Eaton, Colo.

Test Plot at Eaton, Colo.

This test was conducted in the Eaton district in the potato-growing area of northern Colorado. The Area 3 PMA supplied part of the funds for the expense of conducting this plot. A large number of seedling selections and several commercial varieties were grown. The purpose was primarily to test horticultural desirability and to increase seedling seed stocks. This plot was rogued several times during the growing season and sprayed to reduce aphid population. The tops were killed before normal maturity by use of vine-killing chemicals. At harvesttime research workers and representative potato growers observed the tubers. Selections were made and specific gravity readings on the selections were made in the field. Schaal table 3 gives the specific gravity, dry matter, and starch content of selected seedlings grown in this plot.

Schaal table 1. Parentage of family lines and number of selections from each in scab test plots.

Family line No.	Selections in tests		Parentage
	No.		
1	18	CS 10999	x B 927-32
3	6	B 927-32	x B 773-8
4	3	B 904-6	x B 927-32
5	13	CS 10999	x B 991-3
6	2	CS 10113	x B 991-3
7	9	B 927-32	x B 991-3
8	4	Yampa	x B 911-3
9	4	B 962-9	x B 927-32
10	3	B 991-3	x B 927-32
11	12	Yampa	x B 927-32
12	1	CS 10136	x B 927-32
14	6	US 627-164	x B 927-32
15	11	B 461-32	x B 927-32
16	8	B 2085-7	x B 927-32
17	4	CS 10113	x B 927-32
20	11	CS 10082	x B 927-32
24	4	CS 7846	x B 2131-3
27	1	CS 9887	x B 400-1
31	3	B 2131-3	x B 385-2

Schaal table 2.. Seedling selections showing scab resistance at Gilcrest and Woody Creek, Colo., and horticultural desirability at Eaton, Colo.

Seedling No.	Tuber Color	Gilcrest	Woody Creek	Eaton	Parentage		
CS 11703	White	+	-	+	CS 10099	x	B 927-32
CS 11710	"	+	-	-	"	x	"
CS 11718	"	+	-	-	"	x	"
CS 11722	"	+	-	-	B 927-32	x	B 773-8
CS 11736	"	+	-	-	"	x	"
CS 11737	"	-	-	+	"	x	"
CS 11742	"	+	-	-	"	x	"
CS 11765	"	+	-	-	B 904-6	x	B 927-32
CS 11780	"	+	+	+	"	x	"
CS 11785	"	+	+	+	CS 1009	x	B 991-3
CS 11827	"	+	+	-	"	x	"
CS 11830	"	+	+	+	"	x	"
CS 11833	"	+	+	-	"	x	"
CS 11851	"	-	+	-	"	x	"
CS 11863	"	+	-	-	"	x	"
CS 11889	"	+	+	+	"	x	"
CS 11908	"	+	+	+	"	x	"
CS 11918	"	+	-	+	"	x	"
CS 11931	"	-	-	+	"	x	"
CS 11932	"	+	+	-	"	x	"
CS 11954	"	+	+	-	B 927-32	x	"
CS 11963	"	+	+	-	"	x	"
CS 11969	"	+	+	+	"	x	"
CS 11974	"	-	-	+	"	x	"
CS 11976	"	-	-	+	"	x	"
CS 11981	"	-	+	-	"	x	"
CS 11986	"	+	+	-	"	x	"
CS 12109	"	+	-	+	Yampa	x	B 927-32
CS 12140	"	+	+	+	"	x	"
CS 12240	"	+	+	+	US 627-164	x	"
CS 12302	"	+	+	+	B 461-32	x	"
CS 12404	"	+	+	-	CS 10013	x	"
CS 12542	Red	-	-	+	CS 7846	x	B 2131-3
CS 12583	"	-	-	+	CS 9887	x	B 400-1
CS 12623	"	+	-	+	"	x	B 2159-1
CS 12626	"	+	-	+	"	x	"

+ = Scab-resistant and desirable tuber type.

- = Scab-susceptible and/or undesirable tuber shape.

Schaal table 3. Specific gravity, starch content, observed disease, and some horticultural characters of seedling selections saved from Eaton, Colo., test plot 1953.

Variety or seedling No	Dry matter	Tuber color	Observed ^{1/} disease	Horticultural characters
Early Gem		Russet	None	Rough, cracked tubers
Knik	20.4	White	None	Good-shape vine & tubers
N 209-43-1	20.7	Red	LR, ST, & mos.	Deed red, somewhat rough
N 311-43-1	24.2	"	do	Deep red, flat type tuber
CS 103-42	21.7	White	Little to none	Med. vine, good yield, good-shape tubers
CS 10513	22.4	"	ST	Round light russet tuber
CS 10522	20.9	"	LR and mos.	Good type & yield
CS 11012	20.4	Red	None	Good shape, yield and color
CS 11082	20.4		LR	Good shape, yield and color
CS 11085	19.7	Red	Very little mos.	Good upright vine, good tuber
CS 11290	19.7	White	ST	Heavy vine, good-shape tuber
CS 11703	21.7	"	None	Poor vine type, early maturity, good tubers
CS 11737	20.7	"	ST	Low vine, good-shape tuber
CS 11780	21.7	"	ST	Med. vine, good-shape tuber
CS 11785	20.7	"	None	Lt. green, low vine, good tubers
CS 11889	21.9	"	None	Low vine, good tubers
CS 11908	19.9	"	None	Med. vine, good tubers
CS 11918	21.7	"	None	do
CS 11931	20.9	"	ST	do
CS 11969	21.9	"	None	Med. spreading vine, desirable tubers
CS 11974	19.2	"	None	do
CS 11976	20.7	"	ST	Upright vine, desirable tubers
CS 12109	19.9	"	None	Med.-to-tall vine, desirable tubers
CS 12140	20.7	"	None	Low vine, desirable tubers
CS 12203	19.9	"	None	do
CS 12240	22.7	"	None	Med. vine, very desirable tubers
CS 12312	21.9	"	None	Upright vine, desirable tubers
CS 12542	19.2	Red	None	Low vine, desirable tubers
CS 12623	18.4	"	None	Low vine, desirable tubers
CS 12583	19.2	"	None	Low vine, desirable tubers

^{1/} LR = leaf roll

ST = Spindle tuber

Mos. = Mosaic

Test Plot at Fort Collins, Colo.

This plot, located 4 miles northeast of Fort Collins, Colo., served to test on a larger scale older selections that originated at the Colorado Potato Station at Greeley, Colo., and several from the Nebraska Agricultural Experiment Station. Several of these tubers were red-skinned varieties. Schaal table 4 lists these selections. No yield test data were taken on these varieties this season in this plot. Previous yield tests had established these varieties as desirable from the yield standpoint. All of the Nebraska seedlings showed varying amounts of scab and would be classed as susceptible. CS 10513 produced a good-shape, high specific gravity tuber, but again was observed to have a high amount of spindle tuber to which it appears to be highly susceptible. Nebraska 209, a deep-red, high-yielding selection, is highly susceptible to spindle tuber and scab, and has low specific gravity. Since yield is equivalent to that of Pontiac and the red color better, it may warrant further testing. Nebraska 311, a round, very dark-red tuber with a russet skin, has a very high specific gravity but does not yield better than Triumph, and has a tendency to grow quite flat in northern Colorado. It keeps very well in storage. May be of value in San Luis Valley.

Schaal table 4. Varieties and seedlings grown at Fort Collins, Colorado

Variety or seedling No.	Tuber color	Horticultural characters
Neb. 311-43-1	Red	Good yield, flat tuber. Further test.
Neb. 120-42-6	White	Good yield, good shape. Does not keep well
Neb. 209-43-1	Red	Deep red, round, good yield.
Neb. 217-43-1	Red	Rogued. Excessive disease
CS 10060	White	Rogued. Excessive leaf roll.
CS 10087	White	Rogued. Excessive leaf roll.
CS 8381	White	Discarded due to large tubers & hollow heart.
CS 10513	White	Good shape, high sp. gravity, excessive sp. tubers.
CS 10185	Russet	
CS 10857	White	Rogued. Leaf roll and spindle tuber.
CS 10581	Red	Discarded. Disease and pale color.
CS 9947	White	Good-shape tubers and good yield.
Ia. 736-42	White	Variable type of tuber. Discarded.
B 73-10	White	Rough tubers. Discarded.

Test Plot in the San Luis Valley, 1953

Potato growing in this high mountain valley is limited as to varieties that can be grown successfully. Needed is a red-skin variety that will supplement the Red McClure variety now grown almost exclusively. Also, a white-skin variety would be of value. The varieties and seedling selections that showed promise in previous years were included in this plot. Since insect populations are lower in this area, virus-free seed stocks are more readily produced here than in

other areas of the State. Schaal table 5 lists the varieties and seedling selections grown in this plot with notes on yield, adaptability, and tuber type. Serious losses due to the western leak disease occurred in this area and considerable varietal difference in the amount of infected tubers was noted. Those with high specific gravity appeared to be most susceptible to leak. N. 311 has a shape and type similar to Red McClure and is superior in specific gravity, freedom from growth cracks, and keeping qualities, and probably will equal Red McClure in yield under most conditions.

Schaal table 5. Seedling selections grown in San Luis Valley, showing adaptability and disease observed.

Variety or seedling No.	Disease observed	Yield & adaptability in San Luis Valley
CS 10513	Considerable spindle tuber	Good shape & yield. Quite well adapted.
B 73-10	" virus disease	Rough & poor type in general. Discarded.
CS 10185	Very little disease	Good yield. Round russet tubers.
CS 8381	Heavy virus infection	Discarded
La. 736-42	Little noted	Lack of uniformity. Discarded.
CS 9947	do	Hollow heart. "
CS 10060	Heavy leaf roll	Rogued "
CS 10087	do	" "
CS 10581	Heavy spindle tuber	" "
N 120-42-6	Very little	Does very well. Possible white variety.
N 213-43-2	do	Sets heavy. Fair yield. Poor appearance.
N 209-43-1	do	Probably yields as well as Red McClure. Possible variety.
N 311-43-1	do	Very good. Possible variety
N 217-43-1	Very heavy disease	Discarded
CS 10857	Light disease	Poor type. Discarded.
CS 10581	do	" "
CS 10160	do	" "
B 73-10	do	" "

ALABAMA (Fairhope)
Frank Garrett

In 1953 drought and excessive rain alternated during the growing season. Considerable rot developed in several of the commercial fields. Twenty-three named or numbered varieties were tested for yield. The data for this test are given in Ala. table 1.

Ala. table 1. Yield test at Fairhope, Ala. 4 replications of 25 hills.

Seedlings and varieties	Parentage	Average yield of marketable potatoes
		Bu.
L.D. 91-143	Cherokee selfed	340
T.L. 1859	Pontiac x 96-56	331
B 73-10		311
L.D. 91-88	Cherokee selfed	305
Cherokee		299
L.D. 81-122	B 76-23 Katahdin	295
L.D. 91-88	Cherokee selfed	288
Pungo		286
Kennebec		280
T.L. 4404 (B3006-16)	TI5 x B 962-32	247
L.D. 92-216	L113 x LaSoda	243
Triumph		243
T.L. 4411 (B2874-4)	B 606-37 x B 56-1	241
T.L. 3972	(Pontiac x B 400-1)	241
L.D. 81-115	B 76-23 x Katahdin	222
L.D. 82-257	(Pontiac x Triumph) 56-1	211
L.D. 81-88	Chippewa x B 76-23	207
L.D. 92-214	L113 x LaSoda	207
T.L. 3976	Pontiac x B 400-1	203
T.L. 2786	B 381-2 x B 56-1	194
L.D. 81-79	Gr. Mt. x Cayuga	186
T.L. 1354	Pontiac x 92-36-5	185
T.L. 2766	B 56-11 x 528-170	178
L.D. 82-265	Pontiac x 15-2	175
L.D. 81-79	Gr. Mt. x Cayuga	162
T.L. 1396	176-26 x 179-26	152
T.L. 4406	B 778-14 x B 400-1	146
T.L. 3943	B 56-11 x B 400-1	136
T.L. 1404	176-26 x 179-26	145
T.L. 4048	B 381-2 x 56-1	124
T.L. 3965-B	B 490-1 x B 56-1	117
T.L. 4001	B 381-2 x B 56-1	90
T.L. 2459	B 381-2 x 96-56	90

L.S.D. at 5%

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ALASKA

C. H. Dearborn and C. E. Logsdon

High Specific Gravity Seedlings
(sp. gr. 1.083-1.097)

A replicated trial of Arctic Seedling, Kennebec, and 10 high-specific-gravity seedlings was conducted to learn whether close spacing of seedpieces (9 inches) and heavy fertilization (120-360-80 pounds of N, P₂O₅ and K₂O, respectively per acre) of these high-specific-gravity low-yielding seedlings would produce a satisfactory tonnage per acre. The test was carried out in cooperation with a good potato grower on newly cleared land. One-half of the fertilizer was broadcast and disced-in, while the remainder was applied as bands with the planter.

Arctic Seedling, Kennebec, 15.45-1-47, 114.42-3-44 and 54.44-1-46 yielded at the rate of approximately 550 bushels of U.S. No. 1 tubers per acre. Several of the other high-specific-gravity selections shatter bruised so severely under this method of culture that the tonnage of U.S. No. 1's was reduced 30 to 50 percent.

Advanced Seedlings

Variety testing was continued in 1953 with 16 varieties for early harvest and 16 varieties for late harvest. As a result of varietal selection, testing, and breeding, 4 new potato seedlings have been released to producers of certified seed. These are 10.44-2-46, 6.47-1-50, 47.44-3-47 and 114.42-3-44. All 4 varieties hold up in storage as well as Arctic Seedling. All varieties are susceptible to common scab, although 10.44-2-46 and 6.47-1-50 seem to have the most resistance of the 4. No foliage diseases have been observed on any variety except possibly mild mosaic in 10.44-2-46. All are white-flowered varieties except 114.42-3-44, which is purple.

Varieties 10.44-2-46 and 47.44-3-47 have been selected to meet the demands for a potato that may be dug between August 1 and September 1 depending upon the growing season. Either variety matures more U.S. No. 1 tubers than Arctic Seedling during this short growing period when planted, fertilized, and harvested at the same time. Either variety will produce many oversize, hollow-heart tubers if planted early and dug late (after September 10). Suggested culture is to plant early, space seedpieces 9 inches apart in rows 38 to 42 inches apart, fertilize heavily, at least 60 pounds of nitrogen per acre, and harvest early.

Characteristics of 10.44-2-46. Plants are two-thirds the size of Arctic Seedling, set 3 to 5 attractive, oblong flattened tubers, and develop them rapidly. The skin is creamy clear and rubs off easily from the new tubers, yet the feathered areas blend well with the remaining skin so that the tubers are attractive. The eye basin and stolon cavity are shallow. The culinary quality is good for an early potato but hollowness is common in very large tubers.

Characteristics of 47.44-3-47. Plants are about two-thirds as large as Arctic Seedling, set 3 to 5 thick, oval, uniformly shaped tubers, and develop them rapidly. The skin is dull white due to a light russeting and adheres well to the tubers. The tubers are blocky, shatter bruise easily if handled roughly, and occasionally show a few growth cracks if produced under adverse growing conditions. Hollowness is common in the extra large tubers. The culinary quality and yield of U.S. No. 1's are very high for an early potato.

Varieties 114.42-3-44 and 6.47-1-50 require the same length of growing season and produce approximately the same tonnage of U.S. No. 1 tubers per acre as other late-maturing varieties. The tubers of both are more attractive than Arctic Seedling.

Characteristics and culture of 114.42-3-44. Plants are one-half as large as Arctic Seedling, set 6 to 8 medium to small, short blocky, uniformly sized tubers. The skin is white to dull white due to light russeting and seldom feathers or slips even under very adverse harvesting conditions. The eye and stolon cavity is not as deep and objectionable as that of Arctic Seedling but is not shallow. The uniformity of size overshadows the surface irregularities to make an attractive package product. Hollow heart occurs only in the exceptionally large tubers of which there are few.

In seasons of low soil moisture the U.S. No. 1 grade is composed of a high percentage of tubers near the lower size limit. The quality of the cooked product is excellent, highly flavored, white, and of a mealy texture. Suggested culture is to plant early, space seedpieces 9 to 11 inches apart in rows 38 to 42 inches apart, fertilize heavily, at least 60 pounds of nitrogen per acre, and harvest late.

Characteristics and culture of 6.47-1-50. Plants are one-half as large as Arctic Seedling, set 4 to 6 very smooth, white, clear-skinned tubers. The skin is tender and slips easily in rough handling, yet the bare spots blend well with the remaining skin. The tonnage per acre of U.S. No. 1's is equal to Arctic Seedling and far more attractive. Very large tubers occasionally show hollow heart and knobiness or second growth but neither condition has been serious. The cooked tubers make an excellent mashed potato, and unlike many varieties the boiled tubers have remained white during and after refrigeration. Suggested culture is to plant early, space seedpieces 7 to 9 inches apart in rows 38 to 42 inches apart, fertilize heavily, at least 60 pounds of nitrogen per acre, and harvest late or before tubers get extra large.

Scab Investigations

Common scab is becoming a more serious problem throughout Alaska each year especially in the Fairbanks area. In 1952 the replicated potato variety trial and the seedlings for observation were planted on land that was heavily infested with scab. Such varieties as Green Mountain, Katahdin, Kennebec, and Pawnee were not marketable due to scab, whereas Ontario, Knik and a few seedlings made marketable tubers. A test in 1953 of 25 varieties and selections at Fairbanks on a very uniformly and severely infested field and a test

of 22 of these varieties and selections in the Matanuska Valley on a field in which the scab was severe in limited areas showed the following to be resistant to scab in Alaska:

<u>Variety or selection</u>	<u>Pustule type</u>	<u>Amount of scab</u>
113.43-1-45	2	Light
528-170	2	Medium
30.47-1-50	3	Very light
Hindenburg	2	Medium
Seneca	2	Light
Ontario	2	Light
Cherokee	2	Medium
113.43-8-45	2	Light
15.47-20-50	2	Medium
Arctic Seedling at Fairbanks (control)	5	Medium to heavy
" " " Matanuska "	2-5	Very light to very heavy

Thirty-nine lines of potatoes bred for scab resistance were obtained from Wisconsin, Wyoming, North Dakota, Maine, and Minnesota. The increase from these lines will be planted in scab-infested soil in 1954. Of these selections 9 showed severe shatter bruising in 1953. They were D27.50, D49.50, 2379, 2485, 2541, 2548, Canus, Keswick and Early Gem.

Breeding

A crop of first-generation tubers (approximately 3,000) is on hand from selfed, crossed, and open-pollinated varieties and numbered selections that have shown some scab resistance under severe scab conditions in Alaska. In addition, Dr. Stevenson and Mr. Akeley have crossed several of our more desirable seedlings with scab-resistant varieties and numbered selections and have generously provided us with seeds.

At Matanuska seed was obtained from 10 crosses made in the field involving Knik, Kennebec, Swiss, Pawnee, Ontario, and 6 seedlings. Ontario was used in 10 crosses in the greenhouse but no seed was produced. The failure may have been due to inadequate ventilation. Lack of fertilization could also be attributed to poor pollen, because the pollen under the aceto-carmin stain showed a very low percentage of plump pollen grains. The significance of this poor pollen was brought out forcefully while observing the prepared slides of the Sturgeon Bay technicians during the potato tour.

CALIFORNIA
Glen N. Davis

Potato plots were grown in Kern, San Benito, and Siskiyou counties in 1953. In all California test plots, fertilizer was applied at planting time at the rate of 600 lbs. per acre of ammonium sulphate. All specific gravity readings were obtained by using the potato hydrometer.

The Kern County planting consisted of a variety yield test plot and a scab-resistance test. The yield test included 10 named varieties and 4 seedlings. Data are given in Calif. table 1. The scab plot, planted on heavily infested soil at the U.S.D.A. Cotton Expt. Station at Shafter, included 4 named varieties and 42 numbered seedlings. The data are recorded in California table 2.

Calif. table 1. Potato variety yield test, Shafter, Calif., 1953.

Variety or seedling	Mean yield	Specific gravity	Dry matter
			Pct.
White Rose	52.	1.083	20.41
Ontario	45	1.092	22.44
Kennebec	52	1.094	22.70
Russet Burbank	23.	1.092	22.44
Katahdin	45	1.096	23.20
Sebago	47.	1.098	23.70
Sequoia	56	1.096	23.20
Cobbler	45	1.095	22.96
Menominee	48	1.098	23.70
Pontiac	50	1.076	18.90
B 2368-4	49		
* B 2368-6	23		
* B 2368-7	28		
B 2368-11	37		

L.S.D. 5% = 7.79

" 1% = 10.4

* Not included in analysis of data

Fertilizer - 600 lbs. per acre, ammonium sulphate.

Approximate area of plot - 1/10 acre.

Calif. table 2. Scab resistance test, Shafter, Calif., 1953.

Variety or seedling	tubers	Tubers in class rating								Average	Market-able
		0	1	2	3	4	5	6	7		
		No	No	No	No	No	No	No	No		Pct.
White Rose	147	18	43	15	33	21	12	5		2.20	51.7
Menominee	60	32	28							.47	100.0
B 2921-4	66	35	31							.50	100.0
B 2161-3	141	26	98	17						.94	100.0
Neb. 59-41	61	14	35	12						.97	100.0
B 2900-42	36		36							1.00	100.0
B 2368-13	61	19	24	12	6					1.08	90.1
B 2921-4	88	13	49	19	7					1.22	92.0
B 3003-36	49	13	18	11	7					1.24	85.7
B 2067-1	29	1	20	6	2					1.31	93.1
B 2921-4	82	6	44	20	12					1.46	85.3
Ontario	55	5	24	11	12		3			1.80	72.7
B 515-2	64	8	21	14	14	7				1.90	67.2
B 2879-4	47	2	15	14	15	1				1.96	66.0
B 2162-49	51		12	21	17	1				2.13	64.7
B 2368-11	72		15	35	17	5				2.20	69.4
B 2162-36	47		11	18	15	3				2.20	61.7
B 2920-13	61	4	14	18	12	13				2.30	59.0
B 2368-6	81		19	21	25	16				2.46	49.4
B 2162-18	59		4	28	25	2				2.40	54.2
B 3009-7	64		9	17	32	6				2.50	40.6
B 2920-20	34		11	8	6	5	4			2.50	55.9
B 2368-4	70		16	17	26	8	2	1		2.50	47.2
B 2920-13	99		1	40	48	10				2.60	41.0
B 2162-49	47			21	26					2.60	44.7
B 2874-4	85		4	24	45	12				2.76	32.9
Cherokee	61		9	15	18	19				2.80	39.3
B 3009-9	78			24	37	17				2.90	30.8
B 2368-6	67		8	17	19	23				2.90	37.3
B 2368-4	62		10	10	22	15	5			2.90	32.3
B 2922-15	121		22	20	40	28	11			2.90	34.7
B 2968-11	67		3	15	37	11	1			2.90	26.9
B 3003-27	67		1	17	35	11	2	1		3.00	26.9
B 2924-2	65			12	31	20	2			3.10	18.5
B 3406-22	83		14	8	11	7	11	32		3.20	26.0
B 2969-12	73			14	26	23	9			3.30	20.5
B 2953-7	42			6	17	19				3.30	14.3
B 2922-26	58			11	18	28	1			3.30	19.0
B 3004-9	95		7	23	20	25	11	7		3.30	33.7
B 2968-66	76			8	31	35	2			3.40	10.5
B 3014-6	142		11	14	37	51	27	2		3.50	17.6
B 73-10	89				38	36	15			3.70	0.0
B 595-76	73				17	38	18			4.00	0.0
B 2921-10	76			5	19	26	17	9		4.10	6.5
B 2968-56	97			9	22	22	22	22		4.30	12.0
B 2368-6	63			4	14	17	14	14		4.30	6.3
B 2875-7	70		2	3	12	20	15	18		4.40	7.4

Fertilizer - 600 lbs. per acre ammonium sulphate.

Approximate size of plot - 1/15 acre.

Plantings in San Benito County included a variety yield test and a test for resistance to Verticillium wilt. The yield test included the same 10 varieties that were tested in Kern County. However, the variety Russet Burbank was considered the check in this case. A uniform number of replications was not planted so no attempt at statistical analysis was made. The results of this test are given in Calif. table 3.

Calif. table 3. Potato variety yield test, Hollister, 1953.

Variety	Mean yield	Ave. specific gravity	Dry matter
			Pct.
R. Burbank	20.5	1.063	16.21
White Rose	25.7	1.079	19.40
Sebago	46.6	1.077	19.17
Katahdin	32.9	1.074	18.42
Sequoia	66.1	1.081	19.92
Cobbler	28.5	1.074	18.42
Pontiac	49.3	1.070	17.69
Ontario	37.1	1.073	18.18
Kennebec	41.3	1.071	17.93
Menominee	34.3	1.078	19.40

Fertilizer 600 lbs. per acre ammonium sulphate.

Approximate area of plot - 1/10 acre.

The test for verticillium wilt resistance included the varieties in the yield test plot and in addition 28 seedlings sent from the U.S.D.A. potato-breeding station at Aberdeen, Idaho, by John McLean. The seedlings A104-1, A104-3, and 1274-4 looked particularly good, and sufficient seed has been requested to place these seedlings in the yield test in 1954. The results of the 1953 test are recorded in Calif. table 4.

The Siskiyou County planting at Tulelake included 10 varieties with Russet Burbank as the check. This was the last plot planted, and the supply of seed at the time limited the planting to 2 replications. No attempt at statistical analysis was made. Data are presented in Calif. table 5.

In addition to the yield test at Tulelake an increase plot of the variety Houma was grown. Four sacks of certified Houma seed were obtained from Vermont, planted at Tulelake, and carefully rogued during the summer. From this plot 100 sacks of seed were obtained. This material is to be planted in Kern County in the spring of 1954 to make a good commercial trial of Houma as grown in California.

Calif. table 4. Test for resistance to verticillium wilt, Hollister, Calif., 1953.

Variety or seedling	Date of reading and condition of plants				
	Aug. 25	Aug. 28	Sept. 10	Sept. 16	*Sept. 24
Russet Burbank	G	d	d	D	D
White Rose	d	d	d	D	D
Sequoia	G	G	G	d	d
Menominee	G	G	G	G	G
Cobbler	d	d	D	D	D
Kennebec	G	G	d	d	d
Sebago	G	G	G	d	d
Ontario	G	G	G	d	d
Katahdin	G	G	d	d	d
Pontiac	G	G	d	d	D
+A101-17	G	G	G	G	G
+A104-1	G	G	G	d	d
A 104-11	G	G	G	G	G
A104-13	d	d	D	D	D
A104-15	G	G	d	d	d
A104-16	G	G	G	G	G
A104-17	d	d	D	D	D
A1-4	G	G	d	d	d
A1-14	G	G	G	d	d
A1-46	d	d	d	d	d
A1-47	G	G	G	G	G
A1-48	G	G	G	G	G
+1274-4	G	G	G	G	G
2851-2	G	G	d	d	d
2861-2	G	G	G	G	G
2913-1	G	G	G	G	G
2913-16	d	d	D	D	D
2913-42	G	G	d	d	d
3116-4	G	G	G	G	G
3191-3	G	G	G	G	G
3191-4	G	G	G	G	G
3193-9	G	G	G	G	G
3195-3	G	G	G	G	G
3200-2	G	G	G	G	G
B2116-3	G	d	d	D	D
B2368-6	d	d	D	D	D
B2368-11	G	d	D	D	D
+A104-3	G	G	G	G	G

G = green - normal in appearance.

d = declining.

D = dead

*Field rolled Sept. 24 preparatory to harvest. No further readings taken.

+ Selected for further consideration on basis of tuber appearance.

Table 5. Potato variety yield test, Tulalake, Calif., 1953

Variety	Mean yield	Specific gravity	Dry matter
			Pct.
Russet Burbank	49.0	1.081	19.92
Cobbler	51.0	1.077	19.17
Katahdin	61.2	1.070	17.69
White Rose	47.5	1.069	17.43
Sebago	57.5	1.080	19.90
Kennebec	53.2	1.083	20.41
Sequoia	63.7	1.077	19.17
Ontario	48.0	1.070	17.69
Pontiac	70.5	1.065	16.47
Menominee	51.0		

Fertilizer - 600 lbs. per acre - ammonium sulphate.

Approximate size of plot - $1/40$ acre.

CONNECTICUT
Arthur Hawkins

Two yield tests were conducted by the Storrs Agricultural Experiment Station, Storrs, Conn., on commercial potato farms in Connecticut in 1953. Experimental procedure is indicated in footnotes to the tables of yields.

High moisture holding soil and no problem with verticillium wilt resulted in excellent yields at Location 1, in spite of hot dry periods during the second week of August and a very hot and dry period (9 days above 90°) during the latter part of August and early September. Kennebec, B 446-8, and B 606-67 outyielded the Katahdin variety. Internal drought spot was very serious in the B 446-8 seedling, since 50% of the tubers had a moderate amount of Internal drought spot.

Poorer yields were obtained at Location 2 where nitrogen fertilization was lower and verticillium wilt was a problem. The Katahdin variety outyielded all other varieties and seedlings with a yield of 517 bushels over 1 7/8". Only one tuber of 40 inspected of B 446-8 had a slight amount of internal drought spot discoloration at this location.

Conn. table 1. Yields and specific gravity of potato varieties and seedlings at Somers, Conn., 1953*

Variety or seedling	Total yield per acre	Yield per acre - over 1 7/8"				Dry matter
		Free of		Off shape <u>1/</u>		
	Bu.	Pct.	Bu.	Pct.	Bu.	
Canso	538	94.0	505	94.0	505	20.9
Gr. Mountain	738	93.2	688	93.2	688	22.2
Houma <u>3/</u>	634	95.0	602	95.0	602	20.2
Irish Cobbler	579	90.0	521	90.0	521	18.9
Katahdin	716	98.4	705	98.4	705	18.9
Kennebec	803	97.2	780	97.2	780	20.5
Keswick	614	97.0	596	97.0	596	20.5
Pungo	614	92.8	570	92.8	570	19.9
Russet Rural	690	92.0	635	92.0	635	21.9
Teton	739	96.5	714	96.5	714	19.9
B 355-35	682	95.3	650	95.3	650	20.4
B 355-44/	594	96.9	575	96.9	575	21.8
B 446-8 <u>4/</u>	824	93.9	774	93.9	774	18.4
B 595-76	572	93.6	536	93.6	536	20.5
B 606-67	889	97.0	862	89.9	799 <u>1/</u>	20.9

1/ Serious off-shape removed. 7.1% off-shape in Seedling B 606-67

2/ Specific gravity by salt solution method. Average of 10 tubers per sample x 4 replications.

Conn. table 1 continued

- 3/ Spacing: 9", except 12" for Houma.
Soil: Enfield fine sandy loam, of good moisture availability, previous crop rye.
Fertilizer: 2,000 8-12-12 band placement; plus ammonium nitrate side dressing.
Size of Plots: 1 row 24 feet long; replication: 4, in four randomized blocks (3 sections x 5 rows). 5 rows, no sprayer damage.
Season and Conditions: Planted May 23. Hot and dry first part of June, second week of August and then last week of August; location low, had good moisture reserve. Some late varieties green until freeze September 25.

- 4/ Internal Drought Spot was present in moderate amount in 50% of the tubers of B 446-8 cut 40 tubers (10 tubers x 4 replicates). None was found in tubers of other seedlings or varieties.

Hollow Heart: Hollow heart found in some varieties. Following are number of hollow heart tubers found in a sample of 40 medium sized ($2\frac{1}{2}$ - 3") tubers (10 from 4 replicates): Canso -1; Pungo -2; Teton - 1.

*Seed: Seed supplied through cooperation of R. V. Akeley, Horticulturist, Division of Veg. Crops and Diseases, U.S.D.A., Presque Isle, Maine.

Conn. table 2. Yields and specific gravity of potato varieties and seedlings at Enfield, Conn., 1953*

Variety or seedling	Total yield per acre	Yield per acre - over 1 7/8"					Dry matter
		Off Shape		Free of Off shape <u>1/</u>			
		Pct.	Bu.	Pct.	Pct.	Bu.	
Canso	280	73.5	206	--	73.5	206	18.6
Green Mountain	365	75.4	275	2.0	73.4	268	19.4
Houma 3/	457	75.7	346	3.1	72.6	332	18.4
Irish Cobbler	337	76.3	257	8.6	67.7	228	16.9
Katahdin	558	92.6	517	5.4	87.2	487	17.4
Kennebec	472	87.3	412	3.1	84.2	397	16.9
Keswick	371	89.8	333	2.0	87.8	325	16.9
Pungo	297	76.0	226	1.9	74.1	220	16.9
Russet Rural	309	79.1	244	.8	78.3	242	18.6
Teton	393	79.8	314	1.7	78.1	307	16.7
B 355-35	419	81.0	340	.4	80.6	338	16.9
B 355-44	222	76.9	171	1.0	75.9	169	18.9
B 446-8	333	80.3	268	3.3	77.0	257	14.6
B 595-76	313	80.7	253	--	80.7	253	18.2
B 606-67	555	88.8	493	5.0	83.8	465	18.6

1/ Serious off-shape removed.

Conn. table 2, continued

2/ Specific gravity by salt solution method. Average of 10 tubers per sample x 4 replications.

3/ Spacing: 9", except 12" for Houma. Seed cut to about 1½ oz.

Soil: Enfield fine sandy loam. Potatoes 1952, and in potatoes several years before rye in 1951. High amount of verticillium wilt in Pontiacs, 1952.

Fertilizer: 2,200 8-10-10.

Size of Plots: 1 row 24 feet long; Replication: 4, in four randomized blocks (3 sections x 5 rows). 5 rows, no sprayer damage.

Season and Conditions: Planted May 13. Opened furrows exposed to rain before seed planted. May have had some leaching of nitrogen since potatoes died earlier than commercial planted Katahdins in adjoining rows. Irrigated in June and during July, yellowing by second week of August and verticillium wilt showing in some varieties. About all dead by latter part of August. Verticillium wilt infected field - high percent in Pontiacs, 1952.

Hollow Heart: Hollow heart found in some varieties. Following are the number of hollow heart tubers found in samples of 40 medium sized (2½-3") tubers (10 from 4 replicates): Green Mountain - 4; Cobbler - 1; Katahdin - 1; Kennebec - 2; Pungo - 1.

*Seed: Seed supplied through cooperation of R. V. Akeley, Horticulturist, Division of Veg. Crops and Diseases, U.S.D.A., Presque Isle, Maine.

DELAWARE
E. P. Brasher

In 1953 at the Delaware Agricultural Experiment Station 13 varieties and seedlings were tested. All of these were selected on the basis of their previous performance. The experimental procedure and conditions were as follows:

Location: University Farm, Newark
Soil: Sassafras Loam
Previous crop: Fallow
Plot size: $3\frac{1}{2}$ x 25 feet (29 seedpieces per 25-foot row)
Plot design: Randomized Block
Replications: 5
Planting date: April 23
Fertilizer: 1,400 pounds of 8-16-16 per acre, in bands at planting time.
Fungicide: Zineb
Insecticide: DDT
Growing conditions: Unusually poor due to the lack of rain.

The results (see table 1) of this test show that Kennebec, B 73-10, B 926-9, and Pungo produced significantly greater yields of No. 1 potatoes than did the standard variety Irish Cobbler. Of these 4 varieties, however, only Kennebec significantly excelled Katahdin in yield. B 73-18, a sister selection of B 73-10, which has performed well for 3 consecutive years slipped somewhat in yielding ability.

The 4 high-ranking varieties in percentage of dry matter were: Mohawk, Irish Cobbler, B 73-18, and B 73-10. Between these varieties there was no statistical significance in dry matter. In previous years, however, B 73-18 has been outstanding in this respect.

In attractiveness both B 73-18 and B 73-10 were good with perhaps B 73-18 excelling all other varieties and seedlings tested. Since both of these seedlings are resistant to scab and late blight and since they have given better performance over a 4-year period than the standard varieties, it appears as if they may become important in Delaware. One serious fault, however, was observed in both B 73-18 and B 73-10. After 6 months in storage at temperatures ranging between 34° and 38° F. an internal breakdown occurred. This breakdown appeared similar to that described by Hilborn and Bonde (Amer. Potato Journal, 19:24-29, 1942) and called mahogany browning.

Delaware table 1. Yield and dry matter of potato varieties and seedlings,
Newark, Del., 1953

Variety or Seedling	Parentage	Yield per acre			Dry matter
		U.S. No. 1	Total	U.S. No. 1	
		Bu.	Bu.	Pct.	Pct.
Kennebec	B 127 x X96-56	272	297	92	15.7
B 73-10	Mohawk x "	243	269	90	15.9
B 926-9	B 66-1 x X792-94	237	283	84	13.0
Pungo	X96-44 x X528-170	231	244	95	14.6
Katahdin	40568 x 24642	220	244	90	14.8
Mohawk	Gr. Mountain x Katahdin	200	216	93	17.2
B 605-10	Pungo x X96-56	199	234	85	15.1
Sebago	Chippewa x Katahdin	195	220	89	13.9
Irish Cobbler	-	184	230	80	17.2
B 355-35	X96-56 x Saranac	176	221	80	14.4
B 73-18	Mohawk x X96-56	163	181	90	16.8
B 962-3	B 81-40 x X245-186	120	167	72	15.8
B 73-3	Mohawk x X96-56	90	120	75	15.9
L.S.D. - 5% level		39	40	--	1.3

FLORIDA (HASTINGS)

A. H. Eddins

Reaction of Potato Varieties and Seedling Selections
to Corky Ringspot

Nine potato varieties and thirty-six U. S. D. A., seedling selections have been tested for their reaction to corky ringspot by growing them in mildly and severely infested soil. Ten to twenty-five plants of three varieties and twenty-seven selections were grown 3 years; two varieties and seven selections, 2 years and four varieties and two selections, one year. The susceptible variety, Sebago, was used as a check. All tubers produced by each plant were examined for symptoms of corky ringspot, and results were recorded. Reaction of the varieties and selections to the disease during the 3-year period is summarized in Fla. table 1.

Fla. (Eddins) table 1. Reaction of potato varieties and seedling selections to corky ringspot when grown in infected soil in 1951, 1952, and 1953.

Affected with corky ringspot		Not affected with corky ringspot 1/	
Variety or selection 2/	Parentage	Variety or selection 2/	Parentage
B 278-27	Gr. Mt. x (X 96-56)	B 73-10	Mohawk x (X 96-56)
B 294-29	Houma x (X 96-56)	B 294-65	Houma x (")
B 351-44	(X 96-44 x Saranac	B 313-8 3/	
B 355-24	(X 96-56) x "	B 313-21 4/	Sequoia x (X95-56)
B 355-35	(") x "	B 355-44	(X 96-56) x Saranac
B 505-75	Chippewa x Teton	B 381-2	B 106-a x (X 599-a)
B 595-135	41956 x Cherokee	B 595-76	41956 x Cherokee
B 605-10	Pungo x (X 96-56)	B 606-3	" x (X 96-56)
B 616-58	Mohawk x (46952)	B 721-1	Earlaine x Teton
B 780-22	(X 792-96) x Teton	B 738-16 3/	Katahdin x Cherokee
B 884-19	(X 792-88) x (X 157-9)	B 929-6	(X 792-88) x B 81-40
B 905-1	(X 927-3) x B 192-12	B 936-12	(X 792-94) x B 294-38
B 911-10	055 x Teton	B 962-9	B 81-40 x (X 245-186)
B 920-7	B 401-3 x B 355-24	B 2911-21 4/	B 446-54 x Teton
B 920-6		B 3010-4 4/	B 607-72 x B 446-8
B 930-11	Teton x (X 792-94)	B 3013-5 4/	B 779-16 x B 929-6
B 2098-35 4/	Mohawk x B 355-44	LaSalle 3/	
B 2896-11 4/	Kennebec x B 445-41	Canso 3/	
B 2900-1 4/	Ontario x B 355-44		
B 3027-19 4/	B 929-6 x B 724-1		
Sebago			
Cherokee			
Kennebec 4/			
Pungo			
Pontiac 4/			
Bliss Triumph 3/			
Keswick 3/			

Fla. (Eddins) table 1 continued.

- 1/ Some varieties and selections may have escaped the disease as it did not occur uniformly in the test areas.
- 2/ All were grown 3 years except as indicated.
- 3/ Grown one year
- 4/ Grown 2 years.

Seven varieties and 20 selections proved susceptible to corky ringspot. No symptoms of the disease were observed in 2 varieties and 16 selections. The disease varied in intensity from one year to the next. Furthermore, it did not occur uniformly in the row or from one row to the next in areas where the susceptible variety, Sebago, was grown. In fact infection in Sebago varied from none to 35 percent, depending upon where it was planted in the plots. Thus, it would be erroneous to conclude that those selections which have shown no symptoms of corky ringspot to date are immune to the disease, as they may have escaped. It will be necessary to plant the selections in more uniformly infested soil to obtain dependable data on their reaction to the disease.

FLORIDA (Hastings)
A. H. Eddins and E. N. McCubbin

In 1953, 6 named and 16 numbered varieties received from T. P. Dykstra were grown in 4 randomized blocks. The rows were 16 feet long and 40 inches apart. The seedpieces were planted 1 foot apart in the row. The plots were planted January 19 and dug April 30.

Tennessee-Louisiana numbers 1859, 2988, 3769, and 3953 outyielded Sebago significantly. Seedlings 580, 3962, 4462, and 4429 looked very promising. The yield data for these tests are given in Fla. table 2.

Fla. (Eddins and McCubbin) table 2. Yields of 22 potato named or numbered varieties tested at Hastings, Fla., in 1953.

Variety name or No.	Parentage	U.S. No. 1	
		Bu.	Pct.
<u>1</u> /TL 3953	B 76-23 x (X157-9)	343	96
Red Warba		327	96
TL 3769	Kennebec x B 522-33	312	93
" 2988	Sebago x (X96-56)	298	94
" 1859	Pontiac x "	280	91
Red Pontiac	B 76-23 x (X157-9)	277	89
Kennebec	B 125 x (X96-56)	273	95
TL 3954	B 76-23 x (X157-9)	273	90
Cherokee	(X96-56) x (X528-170)	272	92
TL 3674	B 446-54 x Teton	267	88
" 3273	TI5 x B 355-24	265	89
" 2817	Empire x Cherokee	243	92
Sebago	Chippewa x Katahdin	237	89
TL 3606	B 608-56 x B 594-46	232	85
" 2473	B 381-2 x (X96-56)	227	91
" 3600	B 608-56 x B 594-46	227	79
" 3997	Kennebec x B 445-41	192	88
New White		192	86
TL 2461	B 381-2 x (X96-56)	190	85
" 2219	Chippewa x B 76-23	177	91
" 3963	B 76-23 x B 445-41	155	78
" 3266	TI5 x B 355-24	140	88
L.S.D. at 5% level		25	
" " 1% "		32	

1/ TL = Tennessee, Louisiana.

FLORIDA (Homestead)
John C. Noonan

The potato growing season at Homestead was satisfactory with the exception of 2 rain and hail storms. Of the seedlings tested 3 came from Maine and the remainder from Tennessee. The varieties came from North Dakota. With the exception of seedlings B 2368-4, T.L. 1354 and T. L. 3972, none of the seedlings exceeded the yield of the commercially grown varieties. Several of the seedlings from Tennessee lacked vigor and did not perform satisfactorily. The results are given in Fla. (Noonan) tables 3, 4, 5, and 6.

Fla. (Noonan) table 3. Yield test at Homestead, Fla. 4 replications of 25 hills.

Seedlings and varieties	Parentage	Average yield per acre	Total solids
		Bu.	Pct.
T.L. 1396	176-26 x 179-26	92	17.4
T.L. 1859	Pontiac x 96-56	181	17.9
T.L. 3807	B 578-39 x B 446-8	23	.
T.L. 3978	Pontiac x B 400-1	119	17.4
T.L. 4001	B 381-2 x B 56-1	8	
T.L. 4058	do	28	
T.L. 4411	do	121	16.5
T.L. 1345 (N.D.)	Pontiac x 15-2	150	12.5
T.L. 1354 (N.D.)	do	272	14.5
B 2368-4			
B 2368-6			
B 2368-11			
LaSoda (N.D.)		209	17.1
Triumph (N.D.)		217	19.0
Cherokee (N.D.)		189	17.4
Pontiac (N.D.)		269	15.7
L.S.D. at 5%		42	

Fla. (Noonan) table 4. Yield test at Homestead, Fla. 3 replications of 25 hills each.

Seedlings and varieties	Parentage	Average yield per acre	Total solids
		Bu.	Pct.
T.L. 1393	148-99 x 179-26	92	14.5
" 3058	B 2162	28	
" 3972	Pontiac x B 400-1	200	15.8
" 3975	Pontiac x B 400-1	47	
" 1345	Pontiac x 15-2	154	12.5
" 1354 (N.D.)	Pontiac x 92-36-5	253	15.5
B 2368-4		271	17.4
B 2368-6		167	15.5
B 2368-11		153	15.5
LaSoda		257	17.2
Triumph (N.D.)		257	19.1
Cherokee		239	17.4
Pontiac		221	15.8
L.S.D. at 5%		55	

Fla. (Noonan) table 5. Yield test at Homestead, Fla. 2 replications of 25 hills.

Seedlings and varieties	Parentage	Average yield per acre
		Bu.
T.L. 2766	B 56-11 x 528-170	19
" 2773	B 56-11 x "	14
" 2786	B 381-2 x B 56-1	119
" 3943	B 56-1 x B 400-1	73
" 4393	(B 2872-1) 528-170 x B 381-2	20
" 4399	(B 2331-1) B 56-11 x B 3	41
" 4441	(B 2879-5) B 381-2 x B 874-15	41
	(B 2179-5)	
" 1345 (N.D.)	Pontiac x 15-2 Selfed	204
" 1354 (N.D.)	" x 92-36-5	217
" 1354 (Tenn.)	" x "	133
Triumph (N.D.)		266
LaSoda (N.D.)		279
Cherokee (N.D.)		295
Pontiac (N.D.)		326
L.S.D. at 5%		89

Fla. (Noonan) table 6. Yield test at Homestead, Fla. One replication of 25 hills.

Seedlings and varieties	Parentage	Average yield	Total solids
		Bu.	Pct.
T.L. 2671	B 56-11 x B 56-1	82	
" 2687	" "	0	
" 2778	" x 528-170	21	
" 2867	Cayuga x T.L. 1158	0	
" 3048	(B 2118-63)	72	
" 4134	C8859 x C7702	0	
" 4145	" x "	159	16.4
" 4164	" "	150	17.1
" 4190	C7724 x B 400-1	57	17.1
" 4405	(B 2162-36) B 381-2 x 528-170	0	.
" 4422	(B 2329-11) B 56-9 x B 381-2	88	17.9
" 4430	(B 2162-36) B 381-2 x 528-170	41	
B 2368-6		186	14.6
B 2368-11		176	14.6
Triumph (N.D.)		228	19.1

GEORGIA

R. Sheldrake^{1/} and J. E. Bailey^{2/}

In 1953, cooperative potato trials were conducted in the mountain areas. These tests were located in Rabun County, Union County, and Dade County. Plots 25 feet long were used in a randomized block design with three replications. Approximately 2,000 pounds of 4-12-12 was applied. In Union County, only 1,200 pounds was used.

The average yield of each variety at the various locations is given in Ga. table 1. Yields were reduced because of the dry conditions existing in 1953.

Ga. table 1. Irish potato variety test, Georgia mountain area, 1953.

Variety	Counties			Mean per acre
	Rabun	Union	Dade	
	U.S. No. 1 per acre	U.S. No. 1 per acre	U.S. No. 1 per acre	
	Bu.	Bu.	Bu.	Bu.
Pungo	230	231	325	262
Katahdin	-	174	227	200
Kennebec	380	190	268	279
Cherokee	195	116	202	171
Sequoia	370	201	215	262
Chippewa	185	166	207	186
B 73-10	145	134	272	184
B 606-37	185	154	235	191
B 605-10	125	104	222	150
Bliss	135	145	215	165
Cobbler	200	180	270	217
Sebago	340	154	255	250
L.S.D.	19:1		39	
	99:1		53	

Samples of many of the varieties from each location were taken to Atlanta and run through a uniform potato chipping process. Color slides were made of most of the chips. The ratings of the varieties after chipping are given in Ga. table 2. It is interesting to note that practically all of the potatoes grown in Dade County (northwest) made unsuitable chips. No definite reason for this anomaly has been worked out. All lots were fully mature.

^{1/} Extension Vegetable Specialist, Athens, Ga.

^{2/} Superintendent, Georgia Mountain Experiment Station, Blairsville, Ga.

Ga. table 2. 1953 potato chipping test ^{1/} Rabun, Union, and Dade Counties, Georgia.

Variety	County	Chips ^{2/}					
		Color		Texture		Flavor	
		Panel 1	Panel 2	Panel 1	Panel 2	Panel 1	Panel 2
		Rating	Rating	Rating	Rating	Rating	Rating
Cherokee	Union	G	G	G	G	G	G
Kennebec	"	G	G	F	G	G	G
Pungo	"	G	F	F	E	E	G
Sebago	"	F	F	G	G	G	G
Chippewa	"	G	G	E	E	E	E
Cobbler	"	G	G	G	G	G	G
B 73-10	"	G	G	G	F	G	G
B 606-37	"	G	G	E	E	E	E
Sequoia	"	F	F	F	F	F	P
Katahdin	"	G	G	E	G	E	E
Cobbler	Rabun	F	F	F	F	G	G
Kennebec	"	F	F	G	G	F	F
Pungo	"	P	P	P	P	P	P
Sebago	"	F	F	G	F	F	P
Cherokee	"	G	G	G	F	G	G
Sequoia	"	P	P	P	P	P	P
Sebago	Dade	F	F	G	G	G	F
Cobbler	"	F	F	G	G	E	P
Kennebec	"	F	F	G	E	G	G
Katahdin	"	F	P	F	F	F	P
B 73-10	"	P	P	F	F	F	F
Chippewa	"	F	P	G	F	F	F
Cherokee	"	P	P	P	P	P	P
Pungo	"	F	P	E	P	F	P
B 606-37	"	P	P	P	P	P	P
B 605-10	"	P	P	G	G	F	F

^{1/} All chipping studies were conducted in cooperation with A. Goldstein, of the H. W. Lay Company, Atlanta, Ga.

^{2/} E = Excellent = Goal F = Fair = Lowest minimum standard
G = Good = Average quality standard P = Poor = Unacceptable

The tests in 1953 were preliminary to enable a decision as to where to go from here in the potato studies. The yields were rather encouraging, despite the dry weather, and it is very possible that the farmers in North Georgia can produce high yields of good quality potatoes for the chipping or table stock market in southern cities.

GEORGIA (Blairsville)

J. E. Bailey

In 1953 the yields at the Georgia Mountain Experiment Station at Blairsville were very low because of low rainfall during the growing season.

Eigh seedlings received from T. P. Dykstra were tested for yield. The data for this test are given in Ga. table 3.

Ga. table 3. Yield of potato seedlings at Georgia Mountain Experiment Station in 1953.

Seedlings and varieties	Parentage	Pieces planted	Total yield per acre of marketable potatoes
		No.	Bu.
Essex		130	108
T.L. 1859	Pontiac x 96-56	100	106
" 2827	Empire x B 61-380	100	
" 3865	B 627-126 x B 381-2	125	90
" 2866	Katahdin x 798	50	50
" 2396	B 76-23 x 792-94	48	36
" 2349	B 56-1 x B 76-23	75	36
" 3730	B 446-58 x B 606-72	75	31
" 2817	Empire x B 61-3	110	24

GEORGIA (Fleming)

H. G. Ukkelberg

The yield of U.S. No. 1 potatoes at Fleming, Ga., was low because of very dry conditions during the period of tuber formation. Practically no rain fell from April 12 to May 20 and high temperatures prevailed during May. The data for the potato varietal tests are given in Ga. table 4.

Ga. table 4. Yield test of varieties and seedlings at the Southeastern Tidewater Soil Conservation Experiment Station, Fleming, Ga., 1953.

Varieties or seedlings	Vigor	Color	Yield		Marketable
			Total	Marketable	
			Bu.	Bu.	Pct.
Pungo	Good	Good	307	121	40
Cherokee	"	"	291	136	35
T.L. 2178	"	"	231	110	49
T.L. 1396	Poor	Poor	216	135	62
B 73-10	Good	Good	212	140	66
Kennebec	"	"	199	90	45
T.L. 2459	Fair	Fair	196	36	18
T.L. 2988	"	Good	187	160	85
T.L. 1859	"	Fair	164	58	39
T.L. 4399 (B2331-1)	Good	Good	155	110	71
T.L. 2219	Fair	"	149	72	48
T.L. 2461	Poor	Fair	136	77	49
T.L. 3708	Good	Good	127	94	76
T.L. 4001	Fair	Fair	106	73	70
T.L. 2396	Poor	Poor	95	30	31
T.L. 4410 (B3008-24)	Fair	Fair	85	40	49
T.L. 3997	Good	Good	80	58	73
T.L. 3606	Fair	Fair	76	53	70
T.L. 3266	"	"	72	53	73

INDIANA
N. K. Ellis and Arthur Wolcott

The problem is still the same in Indiana where the bulk of the commercial acreage is grown on muck soil. The principal varieties are subject to both surface and pitted scab, and at present the Indiana market is for a smooth white-skin potato. Cherokee looked promising until 1953 when it showed up to be quite subject to break-down under the extremely high temperatures that prevailed. This condition seemed to be accentuated when the potatoes were grown under irrigation.

Coupled with the requirements of a white smooth-skin variety that is scab-resistant is the need for a tuber of high dry weight and one not susceptible to internal browning. Some seedlings that show a high degree of resistance to internal necrosis and vascular browning have been observed.

Ind. table 1. Variety and seedling trial, Rensselaer, Ind., 1953

Variety or seedling		Yield ^{1/} per acre	Scab	Hollow heart	Vascular discoloration	Necrosis
		Bu.	Index	Pct.	Pct.	Index
1	Pontiac	770	2-2	10.8	.6	4.3
2	Kennebec	671	1-2	3.0	.5	3.9
3	Ontario	667	2-1	1.8	2.3	16.7
4	Waseca	621	2-2	.5	9.5	1.2
5	Redkote	603	3-1	7.8	7.0	1.6
6	Sebago	588	2-2	3.0	3.0	13.5
7	BE 2335-42	578	1-1	5.5	.3	3.5
8	Cherokee	574	2-1	.5	13.3	1.6
9	Satapa	561	1-4	.0	18.8	2.4
10	Chippewa	527	1-4	.5	9.8	3.9
11	Katahdin	525	1-4	1.0	3.8	4.5
12	BE2335-51	521	1-2	0	5.1	2.9
13	B 759-34	510	2-1	3.0	3.3	2.6
14	Irish Cobbler	504	1-4	3.5	3.0	4.0
15	Russet Burbank	498	0-0	1.8	4.0	3.3
16	Russet Rural	478	2-2	.5	11.3	7.8
17	BE 2328-5	473	2-1	.3	2.0	4.6
18	Triumph	446	2-3	.8	2.3	3.2
19	M - 804	327	3-1	3.8	15.5	34.0
20 ^{2/}	I 947-13	530	3-1	.0	0	5.3
21	I 8119-2	481	1-1	8.0	0	2.0
22	BE 2334-10	426	0-0	8.0	0	2.0
23	I 911-7	453	1-1	.0	0	6.7
24	BE 2332-37	418	1-1	.0	6.0	0.
25	B 2140-26	555	2-2	24.0	4.0	2.7

^{1/} 8 replications

^{2/} 20-25 are observations from 1-100 hill plot.

The data shown in Indiana table 1 were taken from a planting made on soil known to produce tubers with internal discoloration. These data indicate that of the named varieties Kennebec, Russet Burbank, Katahdin, and Triumph have a minimum of internal discoloration, but each of these varieties *has* external defects either as misshapen tubers or susceptibility to scab. Of interest, therefore, are certain seedlings among which are BE 2335-42, BE 2335-51, BE 2328-5, and BE 2332-37, all smooth white-skin potatoes with a minimum of scab on muck soil. Three Iowa seedlings, I 947-13, I 8119-2, and I 91107, are promising as they show no vascular browning. I 947-13 is a bright red tuber which should be of interest to those who want a red-skin variety.

BE 2334-10 is a netted-skin, yellow-flesh variety in which there is some grower interest.

IOWA

C. E. Peterson, W. J. Hooker, A. E. Schark,
Roland G. Timian, and Frank L. Blankenburg

Potato-Breeding Work in Iowa in 1953 Included the Following:

1. Seed and seedling production in the greenhouse at Ames. Seedling plants in flats were screened for resistance to late blight and virus X whenever such tests were appropriate.
2. Selection of new seedlings in the field.
3. Testing varieties and selections for adaptability in observation plots and replicated yield trials on muck soil at Clear Lake, Iowa. Material in these trials was also included in chipping trials and specific gravity determinations, and was observed for internal defects.
4. Production of disease-free stocks of new and advanced selections at Northwood, N. Dak.
5. Distribution of seedling progenies and selections to potato workers in other States.
6. Development of methods and improving techniques of testing for disease resistance.
7. Testing varieties and advanced selections in chipping trials.

Seed and Seedling Production

In 1953 at Ames 86 crosses were made among parent clones selected for disease resistance or good horticultural qualities. Every cross involved resistance to scab in one or both parents, and all except 9 of the progenies included resistance to late blight. Many of these crosses were made among parents possessing resistance to several races of the late-blight fungus. Twenty-nine progenies included immunity to virus X, as well as resistance to both scab and late blight. Some crosses were also made with parents having resistance to other diseases. In these crosses, resistance to leaf roll, virus Y, virus A, and ring rot received some attention.

A good set of seed was secured. This seed, which was extracted in the spring of 1953, was not used in producing the seedling crop in the fall of the same year. All of the 1953 seed is on hand for production of the 1954 seedling crop in the greenhouse. In order to get the uniform germination and stands desired for seedling screening, we have found it necessary to use 1-year-old seed and to follow the pre-planting incubation treatment described in the 1952 report. Seed from crosses made in 1952 was sown in flats in July of 1953 and more than 20,000 seedling plants, representing

97 progenies, were transplanted in 3-inch pots in the greenhouse. All of the seedling progenies were screened for late blight, and a few were screened for both late blight resistance and virus X immunity before transplanting. Virus-X screening was not so extensive in 1953 as in preceding years because of a lack of seed from progenies segregating for X immunity. Seedling tubers, harvested in November and December provided some 20,000 tubers for planting at Clear Lake, Iowa, in 1954, and approximately 19,000 for distribution.

Distribution

In the spring of 1953 more than 10,000 seedling tubers were distributed to 4 States. In January 1954, more than 19,000 seedling tubers were distributed to 6 States. The distribution of seedling tubers from Ames is shown in Iowa table 1.

Iowa table 1. Distribution of seedling tubers from the greenhouse crops grown at Ames, Iowa, 1952-1953.

<u>State and year</u>	<u>Cooperator</u>	<u>Tubers</u> <u>No.</u>
<u>1952 crop (distributed March, 1953)</u>		
W. Virginia	K. C. Westover	1,059
Wisconsin	G. H. Rieman	7,037
N. Dakota	W. G. Hoyman	578
Ohio	J. P. Sleesman	<u>2,049</u>
Total		10,723
<u>1953 crop (distributed January, 1954)</u>		
W. Virginia	K. C. Westover	2,192
Wisconsin	G. H. Rieman	4,133
N. Dakota	W. G. Hoyman	4,765
Ohio	J. P. Sleesman	3,407
S. Carolina	F. L. Haynes	2,227
Louisiana	T. P. Dykstra	<u>2,848</u>
Total		19,572

Solanum Species

Interspecific crossability and the introduction of disease resistance into Solanum tuberosum has been emphasized in species hybridization. In the fall of 1953, 37 interspecific crosses produced seed. The number of crosses has been reduced this year in order to concentrate on producing a large amount of seed of each cross. Three progenies of crosses between Solanum demissum and Solanum tuberosum were planted for a second backcross to S. tuberosum. In addition, clones of several species reported to be resistant to diseases other than late blight are being tested and utilized in crosses. Progenies from several interspecific crosses, as well as seedlings of some species, have been screened for resistance to the common race of late blight. Virus-Y

tests were also made on some clones of introduced species. More intense screening of crosses made in 1951 is planned for the coming year.

A program to introduce disease resistance, as well as other desirable characters from foreign commercial varieties, has been started this year. The majority of the material used in these studies has been obtained as tubers or seed from the Potato Introduction Station, Sturgeon Bay, Wis., through the courtesy of R. W. Hougas.

Field Plots

More than 14,000 single hills were grown at Clear Lake from seedling tubers produced in the greenhouse at Ames. There were 106 progenies represented most of which were segregating for resistance to scab, late blight, and virus X. Only 210 single-hill selections were made from this material and saved for further observation.

A total of 520 observation plots were grown at Clear Lake. Most of these were second- and third-year selections from the Iowa program and selections from breeding programs in other States. Tubers saved from the observation plots were used for specific gravity determinations, observations of internal defects, and chipping tests. From the observation plots 120 selections were saved for further testing or for use as parents.

Seed-maintenance plots were grown at Northwood, N. Dak. through the cooperation of J. G. Hoyman. The seed plots included 375 accessions, most of which were grown in quantities of 1 to 5 tuber-units. A few of the most promising advanced selections were grown in quantities up to 20 tuber-units. All of the tubers planted in the Northwood plots were indexed in the greenhouse before planting.

Yield Trials

In 1953, 2 yield trials were grown in muck soil at Clear Lake. One included 9 named varieties and 11 numbered selections that were either developed in Iowa or of special interest in Iowa. The other was the Regional Trial which is part of the cooperative testing program carried on by 9 North-Central States. Data from the first trial are presented in Iowa tables 2 and 3 and from the Regional Trial in Iowa tables 4 and 5.

The varieties and selections in yield trials were tested in 5 replications of 25 hills each. Spacing was 12 inches between hills and 36 inches between rows. Fertilizer treatment was 700 pounds per acre of 0-9-27 broadcast and disced in just before planting. Date of planting was May 12 and harvest was September 17. Frost on September 10 killed all the vines and no doubt acted to the advantage of early maturing varieties. There was ample moisture until early August, and it was extremely hot and dry for the remainder of the season. Yields were very low and extremely variable, and for this reason probably do not provide a reliable estimate of performance under normal conditions.

Iowa table 2. Performance of potato selections and varieties at Clear Lake, Iowa, 1953.

Variety	Yield per acre			2/ Scab	3/ Specific gravity	4/ Total solids	Remarks
	Total	U.S.	1/ No. 1				
	Bu.	Bu.	Pct.			Pct.	
LaSoda	553	423	76.5	1-4	1.068	17.1	Rough, deep eyes
R. Pontiac	458	347	75.8	2-4	1.062	15.7	Infolded end-deep eyes
Sebago	360	296	82.0	2-2	1.069	17.4	Good skin and tuber type
Redburt	402	274	68.2	1-4	1.066	16.7	Rough, deep eyes; resembles LaSoda
I8140-1	304	257	84.5	1-1	1.079	19.4	Pink, high quality, smooth
I8168-1	306	235	76.8	1-2	1.059	15.2	Rough, deep eyes, good size
I8168-26	239	223	93.3	1-1	1.058	15.0	Late-blight rot, smooth skin
Cobbler	371	199	53.6	2-4	1.076	18.8	Rough, deep eyes
X26-8	269	196	72.9	1-2	1.068	17.2	Many undersize
I44-16-1	229	184	80.3	1-2	1.069	17.2	Round white, good skin
Osage	211	180	85.3	1-1	1.068	17.0	Long, smooth
Kennebec	254	179	70.5	1-4	1.071	17.7	Fair shape
I8169-8	206	163	79.1	1-2	1.073	18.1	Very deep eyes
Ontario	258	162	62.0	1-1	1.069	17.2	Points and pears, irregular
I8168-28	204	149	73.0	1-1	1.060	15.3	Growth cracks
I907-2	173	135	78.0	1-2	1.077	18.9	H. cracks, good type, rough skin
I961-1	136	111	81.6	1-3	1.063	16.0	Many undersize, low yield
I976-3	186	107	57.5	1-1	1.072	17.9	Small, deep eyes
Cherokee	157	105	66.9	0-0	1.072	17.9	Many under size
B 2847-15	82	51	62.2	1-1	----	----	
L.S.D. P .05		91			.004		
P .01		121			.005		

- 1/ Undersize and external defects removed. Average of 5 replicates.
- 2/ First figure indicates area: T = trace; 1 = 20% of area covered; and 2 = 21-40% of area covered. Second figure indicates type of scab lesions: 1 = surface russet type; 2 = raised surface or shallow pit; 3 = deep pit; 4 = very deep-pitted scab. Highest scab reading of 5 replications.
- 3/ Mean of 4 replications.
- 4/ Total solids determined from specific gravity readings, mean of 4 replications.

Among the varieties in Iowa table 2, LaSoda produced the highest yield but because of rough tubers and deep scab it would not be recommended without further trial. Redburt and Red Pontiac were both among the top yielders but they showed the same defects as LaSoda. Sebago was the most attractive in appearance among the top yielders and it was relatively free from scab defects (0.2% scab culls, Iowa table 3).

Iowa table 3. Summary of grade defects found in potato selections and varieties at Clear Lake, Iowa, 1953.

Variety or selection	External defects <u>1/</u>						Internal defects <u>2/</u>			
	Under-size	Scab	Growth cracks	Second growth	Sun-burn	Total ext.	Hollow heart	Inter necrosis	Vascular discolor.	Normal <u>3/</u> tubers
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
LaSoda	10.3	4.2	3.5	4.5	1.0	23.5	0	1	9	80
Red Pontiac	8.2	14.6	.0	1.4	.0	24.2	2	0	6	92
Sebago	15.3	.2	.0	1.4	1.2	18.0	1	4	21	73
Redburt	11.6	7.7	1.2	8.0	1.9	30.4	0	0	6	94
I8140-1	8.9	.0	2.2	2.9	1.5	15.4	1	1	0	98
I8168-1	12.1	.0	3.3		7.0	22.5	0	1	23	76
I8168-26	4.4	.0	.0	1.1	1.2	6.7	0	0	0	100
Cobbler	14.0	23.5	.0	6.5	2.1	46.3	9	0	34	55
X26-8	24.1	.0	.6	2.4	.1	27.2	0	1	5	94
I44-16-1	15.7	.0	.8	.4	2.5	19.5	2	12	12	74
Osage	5.8	.0	.0	.5	8.3	14.5	4	0	5	93
Kennebec	9.8	.9	4.7	6.2	7.9	29.5	0	1	7	88
I8169-8	12.7	.0	.6	2.0	5.6	20.8	0	0	15	85
Ontario	21.2	.0	5.5	8.5	.7	36.7	0	1	37	63
I8168-28	12.0	.0	12.7	2.1	.0	26.7	1	0	0	99
I907-2	20.3	.0	.0	.4	1.6	22.3	1	50	0	50
I961-1	17.2	.0	.0	.4	1.0	18.6	0	1	0	98
I976-3	29.1	.0	4.9	7.8	.5	42.0	0	0	3	97
Cherokee	24.8	.0	2.1	5.4	.7	33.0	0	0	20	85
B 2847-15	34.7	.0		.7	2.3	37.8	0	0	0	100

1/ Mean of 5 replications expressed in percentage by weight

2/ Internal defects based on five 20-tuber samples expressed in number of tubers rather than weight. Samples for cutting were drawn from tubers that graded U.S. #1 on external appearance.

3/ Total number in 100-tuber sample that showed no internal defects. Some tubers had more than one type of internal defect.

Iowa table 4. Performance of potato varieties and selections in Regional yield trials, Clear Lake, Iowa, 1953.

Variety or selection	Yield per acre			Scab ^{1/}	Total ^{2/} solids	Remarks
	Total	U.S. No. 1				
	Bu.	Bu.	Pct.			
Cobbler ck.	354	243	68.6	2-4	17.6	Rough, deep eyes
Triumph "	279	187	67.0	2-4	15.0	Harvest cracks, deep scab, rough
Neb. 89.46-1	68	40	58.8	1-1	15.5	
" 26.44-1	308	234	76.0	1-3	17.4	
" 127.47-1	295	199	67.4	2-4	17.6	
Min. 358	278	174	62.6	2-3	18.4	Some pear shapes
Min. 24	313	201	64.2	2-4	16.5	Very deep scab
Kan. Pungo	373	326	87.4	1-3	18.4	Rough, irregular
" B 69-16	148	107	72.3	1-2	17.9	Some pointed and pear-shaped
" B 606-67	371	257	69.3	2-3	17.6	Deep eyes, irregular
N. D. Manota	329	180	54.7	2-4	16.2	Smooth, deep scab
" B 515-2	121	81	66.9	0-0	13.7	Rough russet, small
Wis. 27.50	222	185	83.3	1-4	16.7	
Mich. 1363	388	311	80.2	1-3	16.2	Deep seed end, deep eyes
Katahdin ck.	316	238	75.3	1-4	17.6	Smooth, deep scab
Wis. 1301	303	221	72.9	1-4	17.4	Good red color, smooth, deep scab
" M 804	231	186	80.5	T-1	17.8	Irreg. shape, flaky skin
Min. 44-2	165	98	59.4	1-2	17.9	Large, irreg., deep ends, flaky skin
N.D. 457-1	396	278	70.4	1-4	18.2	Smooth, very good type & skin
" Redkote	405	321	79.3	1-2	16.2	Red, smooth
Ia. 6316(Osage)	299	243	81.3	1-1	17.6	Long, smooth, much sunburn
" Cherokee	253	190	75.1	T-1	18.7	Small size, irregular
" X26-8	290	191	65.9	T-1	17.3	Too much undersize
Mich. R 77-29	161	111	68.9	1-3	15.5	Good skin, deep scab
" BP 46-4	163	103	63.2	1-2	18.7	

^{1/} See footnote 2, table 2.

^{2/} Based on specific gravity of the tubers; means of four 25-tuber samples.

Iowa table 5. Grade defects of entries in regional yield trial Clear Lake, Iowa, 1953.

Variety or selection	External Defects <u>1/</u>						Internal Defects <u>2/</u>				Normal <u>3/</u> tubers
	Under-size	Scab	Growth cracks	Second growth	Sun damage	Total ext.	Hollow heart	Internal necrosis	Vascular discolor.		
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.		
Cobbler ck.	8.2	11.1	0.2	9.7	2.0	31.2	1		35	69	
Triumph "	13.9	11.1	1.9	5.0		32.9			12	88	
Neb.89.46-1	37.5	.0	2.6			40.1			16	83	
" 26.44-1	14.5	8.9	.6			24.0	5		19	77	
" 127.47-1	8.6	23.8	.3			32.7	4		4	92	
Min. 358	16.5	15.2		3.3	2.4	37.5	4		59	40	
" 24	8.3	25.9	.4	.2	.8	35.7			11	89	
Kan.Pungo	8.5			2.0	2.2	12.7	26		33	49	
" B69-16	17.7	.8		2.3	6.8	27.6			12	88	
" B606-67	6.2	8.3	1.8	8.9	6.1	31.3	1		14	85	
N.D.Manota	14.2	28.3	2.1	.7		45.3		2	15	83	
" B515-2	13.9		19.4			33.3		4	4	92	
Wis.27.50	10.4	1.1		2.7	2.3	16.6		2	19	77	
Mich.1363	10.3		.6	3.9	5.0	19.8		2	20	78	
Katahdin ck.	9.0	7.5		.9	7.2	24.5	5	2	9	84	
Wis.1301	13.6	10.4	2.0	.9		26.9	2	1	16	81	
" M 804	16.4		.5	2.7	.2	19.8	4	20	26	50	
Min. 44-2	15.2	.3	1.2	23.0		39.7			7	93	
N.D. 457-1	8.2	7.1	4.2	4.1	6.1	29.6	7	27	2	68	
" Redkote	17.3		.1	2.4	.8	20.7	6		6	86	
Ia.6316(Osage)	4.2		.6	3.0	11.1	18.9	11			89	
" Cherokee	17.4		2.1	3.7	1.4	24.7			8	92	
" X26-8	26.7		.3	6.5	.8	34.3			1	99	
Mich.P. 77-29	28.3	.2	.2	.4	1.8	31.0	1		3	96	
" EP 46-4	29.1		5.9	.4	1.4	36.8	14		6	80	

1/ Based on percent by weight, average of all five replications.

2/ Based on number of tubers in 4, 25-tuber samples that graded U.S. #1 on external appearance.

3/ Based on number of tubers showing no internal defects; some tubers had more than one type of defect.

Ia. 8140-1 was the outstanding potato in this trial on the basis of smoothness, freedom from defects, and high cooking quality. This is the first year it has been yield-tested but its high dry-matter content has been observed over the past 3 years. The color may be too light to be accepted commercially but because of its exceptional cooking quality and freedom from scab it will be continued in additional trials.

The newly named variety, Osage was included in both trials. In the regional trial (tables 4 and 5) it yielded the same as Cobbler in U.S. #1. It produced 11% hollow heart compared with 1% for Cobbler. In the other trial (tables 2 and 3) Osage yielded slightly less than Cobbler (180 compared with 199 bushels) and produced only 4% hollow heart compared with 9% for Cobbler. Osage is free from scab defects and tubers are smooth and uniform. More than 1,000 acres were planted to Osage commercially in 1953.

In the regional trial reported in tables 4 and 5, the variety Redkote continued to show promise as it did in 1952. Like many other varieties in this drought year it produced an unusually high percentage of undersize. However, it was free from scab defects and its only internal defects of any consequence was 6% hollow heart.

Among the white varieties in the regional trial (table 4), N.D. 457-1 was one of the most attractive and was among the highest yielding. Upon examination for internal defects it was found that this selection produced 27% internal necrosis (table 5).

The new variety Manota was the most severely scabbed of all entries in the regional trial, having 28.3% of culls due to scab. The unusual susceptibility of this variety to scab will rule it out as a possible variety under Iowa conditions.

Early Gem is another new variety that gave unsatisfactory performance in Iowa in 1953. This variety was also tested in 1950 and 1952, and it has not yet produced satisfactory yields or cooking quality under Iowa conditions. This year it produced only 81 bushels per acre of U.S. #1 potatoes and total solids content of 13.7% (table 4). The most serious grade defect in Early Gem was growth cracks amounting to 19.4% (table 5.)

The same entries shown in Iowa tables 4 and 5 were included in trials in 9 States in the north-central region, and their performance for all locations will be summarized in a separate report.

Late Blight

Parent stocks are being tested against races of Phytophthora infestans and suitable sources of resistance used in the crossing program. For evaluating parent stocks excised leaves have been exposed to infection in glass-covered moist chambers with very satisfactory readings.

Seedling plants are screened before transplanting to the greenhouse bench. Where X-immunity is also present in the cross, seedlings are inoculated first with virus X, and plants exhibiting symptoms of X infection are removed before going into the late-blight test. This procedure is followed because necrotic

flecking of plants resistant to late blight is readily confused with early local lesions following X inoculations.

Virus X

A rapid means of selecting immune seedling plants from a segregating population of potatoes has been established. It consists of inoculating plants in the seedling stage before transplanting to the greenhouse bench using a paint spray gun and an inoculum-carborundum mixture. Inoculum consisted of expressed sap from Nicotiana glutinosa infected with a suitable isolate of virus X^{1/} diluted 1 part in 10 parts of water.

A suspension of 12 g. carborundum, 400-mesh, was added per 100 ml. of inoculum and the suspension applied with a pressure of 15 lbs. per sq. in. Very satisfactory infection was obtained with a plant to nozzle distance of 1 cm.

After inoculation, seedlings expressed symptoms in 6 to 22 days as a necrotic local lesion or as a systemic necrosis. Diseased plants were discarded and symptomless plants transplanted to the greenhouse bench. In order to eliminate escapes from the first inoculation a second inoculation was made by hand-rubbing leaves of individual plants after plants had recovered from transplanting and were growing well. Symptoms were necrotic local lesions, systemic necrosis or a systemic mottle. Immune plants remained symptomless following inoculation. When suitable isolates of virus X were used, symptomless masked carriers of virus X were not present.

From several progenies segregating for immunity to virus X, 6,745 plants were inoculated with the spray-gun method. Of this group 32 percent expressed symptoms of X infection and were discarded. After transplanting and the second inoculation an additional 8.8 percent more plants developed symptoms of virus X and were discarded. The remaining plants were grown to maturity and selections made from the field the following season. These selections were tested once more following greenhouse indexing and with only 1 or 2 exceptions all were demonstrated immune to virus X.

Virus Y

Progenies reported to carry resistance to virus Y were exposed to aphid transmission and duplicate lots were exposed to the same isolates of virus Y in mechanical inoculation tests. It is too early to evaluate results of these two methods of inoculation.

^{1/} Isolate X5 which is the best isolate so far obtained is available to anyone upon request.

Leaf Roll

Resistance to leaf roll is being tested using aphids in 12' x 24' x 6' cages covered with 32- x 32-mesh lumite screen. Indexed plants are exposed to infection in these cages using viruliferous aphids cultured on leaf-roll-infected Datura stramonium plants.

LOUISIANA

Julian C. Miller, R. E. Webb, and J. R. King^{1/}

Over 15,000 seedlings were grown in the greenhouse this year, and selections were made for planting in South Dakota. Approximately 3,500 single tubers from individual plants of 16 parental combinations were planted in South Dakota early in May for observation and selection.

Eighty-two seedlings, plus certain selected lines and varieties, were planted this spring in observational, preliminary, and advanced trials at Baton Rouge, Diamond, Donaldsonville, and New Roads. These trials, together with the selections planted in observational, preliminary and advanced trials at Clark, South Dakota, constituted the 1953 Irish potato plantings of older selections designed principally for a study of yield and tuber/foilage characteristics. All lines were planted at Baton Rouge; and, where seed tubers were available, these seedlings were also planted at Diamond, Donaldsonville, and New Roads.

Almost ideal weather conditions prevailed during the growing and harvesting seasons at Diamond, Donaldsonville, New Roads, and Baton Rouge.

LaSoda has (as in previous years--table 1) continued to outyield all standard varieties and promising seedlings. Red LaSoda, a mutation from LaSoda, apparently will produce as well as, or slightly better than LaSoda. Both of these varieties produce 90-99 percent No. 1 tubers of premium grade, while Red LaSoda also promises to give the growers a skin color that is most desirable for the red potato market.

Triumph yielded about as expected from previous experience. Some growers had excellent yields of good smooth tubers of this variety. It is gradually giving way to LaSoda because of the latter's high yields of attractively colored, smooth tubers.

Kennebec had the same difficulty which growers encountered during 1950. The excessive tuber rot, however, was not as extensive as before; and some growers still wish to grow this variety, particularly for local markets.

Cherokee was early in all plots, and yielded well; however, the tubers tend to be too flat and irregular in shape. Since the tubers were entirely free

^{1/} In cooperation with Dr. T. P. Dykstra of the United States Department of Agriculture and the National Potato Breeding Program.

Louisiana table 1. Combined results of 5 yield trials of 5 potato varieties at 8 locations in Louisiana during the past five years.

Variety	Location								State average
	Diamond	Thibo-	Baton	Hammond	New	Chase	Calhoun	Donald-	
	5 yr. ave.	deaux 2 yr. ave.	Rouge 5 yr. ave.	5 yr. ave.	Roads 4 yr. ave.	2 yr. ave.	4 yr. ave.	sonville 1 yr. ave.	
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
LaSoda	195	140	226	153	282	140	150	319	201
DeSoto	136 ^{1/4}	153	200 ^{1/4}	147 ^{1/4}	249 ^{3/4}	86	129 ^{2/4}	---	157
Katahdin	146 ^{2/4}	168	141 ^{2/4}	152 ^{1/4}	259 ^{1/4}	---	81 ^{1/4}	---	156
Triumph	165 ^{1/4}	94	160	140	166	48 ^{1/4}	108	154	130
Kennebec	177 ^{1/4}	171	206	104 ^{3/4}	246 ^{3/4}	94 ^{1/4}	104	326	179

Yields expressed in bushel/acre No. 1's.

1/ 1-year average 2/ 2 year average 3/ 3 year average 4/ 4 year average

of scab, growers who have a scab problem may use this variety for limited local markets.

Preliminary seedling yield trials in 1952 at 2 locations in Louisiana and 1 location in South Dakota, together with 1953 advanced yield trials at 4 locations in Louisiana and 1 in South Dakota, indicate promising selections which had yields within 25 percent of the yield of LaSoda grown in the same trials (table 2). LaSoda is now being used as the standard in the red seedling yield trials.

Other red lines are being retained for further study because of their color, production and vigor, range of adaptability, or blight resistance. These include Lines 82-94, 92-105, 92-23, 92-167, 02-14A, 02-63, and 02-76.

Several of the white tuber lines produced very satisfactory yields of high quality tubers. The majority of these seedlings will be included in the preliminary yield trials next year because of their promise and the lack of complete data on them for this past season.

Seedling 81-113, a blight-resistant but scab-susceptible line shows promise of being a very early, high-yielding white-tubered type. The tubers are medium to large, smooth, of excellent quality, and have a tough skin. This line is being increased for more extensive trials with growers next season.

Line 91-143, which is blight-resistant but scab-susceptible produces a flattish-oblong white tuber of high quality. Its tubers are more uniform and larger than those of Cherokee. This line is being increased for further trials on a commercial basis.

Louisiana table 2. Preliminary seedling yield trials in 1952 at 2 locations in Louisiana and 1 location in South Dakota, together with 1953 advanced yield trials at 4 locations in Louisiana and 1 in South Dakota, indicate promising selections which had yields within 25 percent of the yields of LaSoda grown in the same trials.

Selection or variety	Yield per acre No. 1's						
	Louisiana				South Dakota		Ave.
	Baton Rouge	New Roads	Donald- sonville	Diamond	Clark	Brook- ings	
	Bu.	Bu.	Bu.	1952 Bu.	Bu.	Bu.	Bu.
LaSoda	352	272			218		281
Pungo	229	226					227
DeSoto	254	233					244
Kennebec	247	222			188		219
81-99	281				181		231
81-113	309	247			172		243
81-122	304	190			176		223
82-269	271	198			210		226
91-10	326				159		243
91-60	254	184					219
91-78	286	246			184		239
91-143	305	251			176		244
92-23	296				184		240
1953							
LaSoda	306		343	213		495	287
Kennebec	182		306				244
91-10	268			188			278
92-23	136		339	221			232
91-78						341	341
82-94						335	335
81-99						454	454
92-105						353	353
81-113	247	230	278	206		416	275
81-115						338	338
91-143	261	266		228		337	273
91-232						353	353
82-269	226	200	214	242		346	246

Fertilizer - 800 lbs. 4-12-4 plus 200 lbs. NaNO_3

Plots - 40 ft. replications; 5 replications.

Louisiana table 3. Showing characteristics of advanced selections in the Louisiana breeding program.

Selection	Parentage	Vigor	Yield	Tuber color	Total ^{1/}	Being bred for following characteristics
					solids	
			Bu.		Pct.	
02-14A	Progress selfed	5	176*	Red	24.5	Color, shape, earliness
02-20	"	4	126*	"	22.4	" " "
02-21	"	2	127*	"	21.6	" " "
02-31	"	4	116*	"	22.2	" " "
02-36	"	3	109*	"	21.2	" " "
01-49	1175 selfed	3	234*	Wh.	25.0	Scab resistant
02-56	1482-2 "	4	109*	Red	19.4	Bl. & scab resistant
02-61	" "	4	---	"	20.9	" " "
02-63	" "	5	170	"	---	" " "
01-64	LaMex x Minn.	4	250*	Wh.	22.9	Scab resistant
02-76	Progress x LaSoda	4	145	Red	24.8	Yield, color, vigor
02-82	" "	4	139*	"	23.3	" " "
02-84	" "	3	161*	"	19.7	" " "
01-116	1175 selfed	3	241*	Wh.	22.4	Scab resistant
01-118	" "	4	204*	"	21.9	" "
01-128	1178 "	4	---	"	23.0	" "
01-144	1187 "	4	---	"	25.5	" "
01-156	" "	4	163*	"	23.5	" "
01-165	1188 "	4	152*	"	21.4	" "
01-175	(2900 x 590) x Kat.	5	---	"	24.5	" "
91-10	Kat. x 494-1	4	297	"	20.7	" "
92-23	L113 x 465	5	216	Red	20.1	" "
91-60	X590 x Katahdin	5	254	Wh.	24.5	" "
91-78	Gr. Mt. x Cayuga	4	229	"	23.7	Quality, yield
92-105	(Chip. x T3-1) x LaMex	4	192	Red	21.4	Color, Yield
91-143	B 61-3 selfed	5	283	Wh.	26.3	Blight resistant
92-167	1121-29 "	4	187	Red	23.5	Scab "
91-232	B 61-3 "	4	180	Wh.	24.4	" "
91-258	Gr. Mt. x Katahdin	5	189	"	22.4	Quality, yield
82-94	X590 x Cayuga	3	241	Red	22.7	Scab resistant
81-99	Gr. Mt. x B 76-23	4	281	Wh.	19.1	Blight resistant
81-113	B 76-23 x Katahdin-	4	278	"	25.6	" "
81-115	" "	3	236	"	25.5	" "
81-122	" "	4	304	"	23.2	" "
82-269	176-26 x 179-26	3	249	Red	23.5	Color, yield
83-274	47156 selfed	4	207	Yel.	24.8	" "
LaSoda	Triumph x Katahdin	3	319	Red	23.2	" "
Kennebec		4	217	Wh.	24.8	Yield, bl. resist.

All starred (*) yield data are those for 1953 at Baton Rouge. All unstarred yield data are averages of the 1952-53 trials at Baton Rouge.

The rating scale for "vigor" is based on the number "3" representing the most desirable type of growth (similar to that of LaSoda). Numbers below "3" indicate progressively too late maturity and too vigorous growth.

^{1/} Percent solids based on specific gravity determinations on tubers grown in South Dakota in 1952.

Table 4 gives the specific gravity, total solids and chipping qualities of certain varieties and promising selections.^{2/} The chipping qualities of these selections have proved equal to, and often better than, those of Kennebec, which has been used as the standard in the tests.

The most promising of the advanced red lines are being increased for more extensive trials with growers.

^{2/} Processing tests were made by Mr. W. A. Sistrunk, Assistant Horticulturist, Horticultural Research Department, I.S.U.

Louisiana table 4. Showing specific gravity, total solids, and chipping quality of certain varieties and promising selections.

Variety or selection	Total solids	Chipping quality
	Pct.	
Red LaSoda	24.2	Good
"	18.4*	"
Kennebec	24.7	Superior
"	18.4*	"
LaSoda	23.4	Good
"	16.4*	"
81-99	19.1	"
81-113	25.8	Superior
"	16.4*	Excellent*
81-115	25.5	"
"	18.6*	Good*
81-122	22.7	Excellent
82-269	23.7	Superior
"	17.2*	Excellent*
91-10	20.9	Superior
91-60	24.7	Good
91-78	23.7	Excellent
91-143	26.3	Superior
91-258	22.4	Excellent
92-23	25.8	Poor
92-167	23.7	Excellent
92-232	24.5	"
01-128	23.2	Good
"	17.2*	Excellent*
01-156	23.7	Good
"	16.9*	Excellent*
01-175	24.5	Good*
"	18.9*	" *

*Data from material grown in Louisiana during the spring of 1953 and processed immediately after harvest.

All unstarred data were taken from material grown in South Dakota during 1952, and processed one week after arrival in Baton Rouge in December, 1952. Samples were received 80 days after harvest, and allowed to recondition 7 days prior to chipping.

MAINE

Reiner Bonde, F. J. Stevenson, and Robert Akeley

Comparison of Yields and Specific Gravity of Promising
Ring-Rot Resistant Seedlings

An attempt was made in 1953 to evaluate a number of selected ring-rot-resistant seedlings regarding their yielding ability and the specific gravity of the tubers produced.

Maine table 1 gives the yield per acre and the specific gravity of 24 resistant seedlings in comparison with 5 named varieties commonly grown in Aroostook County, Maine.

The data show that seedling B 721-29 produced the highest yield for the experiment but the tubers had a low specific gravity. It is significant that four other resistant seedlings gave yields that were equal to Kennebec, Cherokee, and Chippewa. Of these B 907-22 had tubers with starch content that was relatively high. Of interest is the fact that Cherokee produced potatoes with starch content that was somewhat better than for Kennebec.

It can be noted that 2 resistant seedlings yielded better than Teton, and 5 better than Katahdin.

Maine table 2 gives the percentage of tubers in each size class. Although the data do not show the tuber shape and general appearance of the crop, they do show the relative size of the tubers. It can be noted that a relatively high percentage of the tubers graded above "2-inch minimum for size." This in some cases was because the tuber defects caused by bruising, sunburning, or "off-shape" were not eliminated in these determinations. It can be stated that all of the selected seedlings included in the test have good tuber shape.

Maine table 1. Pedigree, parentage, yield per acre, and specific gravity of ring-rot-resistant seedlings. Commercial varieties included for comparison, 1953

Pedigree	Parentage or variety	Yield <u>1</u> / per acre	Total solids
		Bu.	Pct.
<u>Group No. 1 <u>2</u>/</u>			
B 721-29	Earlaine x Teton	585	18.9
<u>Group No. 2 <u>3</u>/</u>			
Kennebec	96-56 x B 127	550	21.2
Cherokee	(X96-56) x (X528-170)	530	21.4
B 2844-(1 ?)	Furore (Sport) x B 607-72	497	19.0
B 907-22	B 30-143 x B 81-40	480	20.5
B 911-31	055 x Teton	478	18.0
Chippewa	40568 x 24642	468	18.7
B 446-8	(X96-44) x Saranac	460	18.2
<u>Group No. 3 <u>4</u>/</u>			
B 2117-2	Sebago x B 355-44	452	21.7
B 766	157-9 x Teton (5)	448	18.9
Teton	Earlaine x 45146	441	19.9
B 911-2	055 x Teton	432	17.9
B 909-1	055 x B 30-143	430	19.0
B 919-28	B 355-24 x (X792-94)	418	20.5
Katahdin	40568 x 24642	415	18.9
B 721-1	Earlaine x Teton	401	17.2
B 931-19	B 355-24 x (X792-94)	401	19.7
B 1161-1	Teton selfed	386	18.7
B 911-21	055 x Teton	385	20.4
B 2574-6	B 446-54 x B 76-23	375	18.8
B 766	157-9 x Teton (11)	374	20.1
B 1161-18	Teton selfed	374	17.7
B 991-14	B 355-24 x B 81-40	372	19.2
B 2395-30	B 607-72 x B 606-3	370	19.3
B 2844 (2 ?)	Furore (Sport) x B 607-72	362	21.1
B 766	157-9 x Teton (15)	359	17.7
B 766	157-9 x Teton (16)	358	20.5
B 2587-1	B 607-55 x B 61-3	345	19.1
B 721-48	Earlaine x Teton	339	18.6
B 766-55	157-9 x Teton	331	18.1
Russet Burbank	Early Rose		20.4

L.S.D. at 5% level is 20.1 barrels or 55.3 bushels.

" " 1% " " 26.8 " " 73.7 "

$\frac{1}{2}$ Average of 5 replicated 1-row plots, each 25 feet long.

$\frac{2}{3}$ Significantly higher than for groups 2 and 3.

$\frac{3}{4}$ " " " group 3.

$\frac{4}{5}$ " lower " groups 1 and 2.

Maine table 2. Comparison of percentage of tubers in different size classes for 24 ring-rot-resistant seedlings and five varieties, 1953.

Pedigree No.	Tubers in each size class						
	1 1/2"	1 1/2"-	2" -	2 1/2"-	2 7/8"-	3 1/4"	Over 1/
	or under	2"	2 1/2"	2 7/8"	3 1/4"	up	2"
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
B 911-31	2.0	10.9	55.7	25.0	5.4	.9	87.0
B 446-8	.5	4.3	33.7	31.3	21.5	8.6	95.2
B 721-29	.8	8.8	43.1	29.3	13.0	5.0	90.4
B 991-14	2.9	14.2	67.7	14.0	1.2	---	82.8
B 766 (5)	1.2	4.8	36.1	35.2	17.0	5.7	94.0
B 911-21	1.4	7.9	54.1	25.2	9.6	1.7	90.6
B 721-1	2.2	7.5	55.0	25.1	8.6	1.6	90.3
B 2117-2	3.1	14.7	59.6	19.7	2.9	---	82.2
B 909-1	.5	4.6	36.7	29.3	21.9	6.9	94.9
B 931-19	.5	4.1	32.7	33.2	26.1	3.3	95.3
B 766 (11)	.3	3.2	53.4	33.4	9.7	---	96.5
B 911-2	1.5	8.9	54.6	27.4	7.6	---	89.6
B 766-55	1.0	4.0	50.7	33.4	10.9	---	95.0
B 1161-1	.6	5.0	44.9	34.0	15.4	---	94.4
B 766 (15)	2.7	15.8	64.2	16.7	.6	---	81.5
B 766 (16)	.6	5.5	38.8	31.7	20.9	2.5	93.8
B 1161-18	.9	5.2	48.9	32.3	10.2	2.5	93.8
B 2587-1	--	4.7	38.8	34.7	17.4	4.4	95.3
B 2395-30	1.5	8.8	51.9	29.8	6.8	1.2	89.7
B 907-22	.5	4.2	30.2	30.2	20.6	14.3	95.4
B 721-48	2.9	12.1	71.6	13.4	---	---	85.0
B 2574-6	1.4	8.1	62.9	24.3	3.2	---	90.4
B 919-28	1.0	6.8	53.9	29.9	8.3	---	92.2
B 2844 progeny	1.8	12.7	66.5	17.8	1.2	---	85.5
B 2844 "	2.0	10.3	50.3	24.3	9.8	3.3	87.7
Kennebec	.2	3.3	29.8	35.3	18.2	13.2	96.5
Katahdin	1.0	6.6	36.5	30.4	24.3	1.0	92.3
Chippewa	.7	5.2	28.5	27.6	22.2	15.8	94.1
Cherokee	.4	3.7	27.4	38.5	23.9	6.2	95.9
Teton	.7	4.9	48.5	34.2	10.1	1.5	94.3

1/ Includes all tuber defects such as bruises, cuts, sunburn, and off-shape tubers.

MAINE

Donald Folsom and Donald Merriam

Yield Test of 11 Leaf-Roll-Resistant Seedlings on Aroostook Farm, Maine

On May 28 2-ounce seed pieces were planted at 12-inch intervals in single-row plots each 20 feet long. Green Mountain, Katahdin, and Kennebec plots, 38 to 39 of each variety, served as controls and were quite evenly spaced over the field. These showed that the field was quite uniform in yield rate with about 6 percent difference from one side to the other and about 11 percent difference from the middle to the ends. Each of the 11 seedling varieties was represented by 5 to 10 plots. The plots of each seedling were distributed in all parts of the field. They were spaced checkerboard-style and each seedling plot had all 3 commercial varieties in the 4 adjoining plots (2 next plots in the same row and 2 parallel plots in the next rows). The seedlings were compared with the commercial varieties with respect to the number of stems per hill, the size of the vines, and the color of the foliage. The tops were killed with a chemical on September 3. The crop yielded data on yield rate, tuber size, and tuber type.

The 3 best seedling varieties are compared with the 3 commercial varieties in Folsom-Marriam table 1. The 8 other seedling varieties yielded 214 to 336

Folsom-Merriam table 1. Comparison of best leaf-roll-resistant seedlings with 3 commercial varieties in Maine.

Variety	Vine size	Yield per A.	Yield ratio	Tuber type
		Bu.		
Gr. Mountain	Larger than Kennebec	401	118	Long-oval and pear-shaped
Kennebec	" " Katahdin	393	115	Thin- to thick-round and pear-shaped
B 2983-17	Like Kennebec	373	109	Like Katahdin
B 2938-22	Like Kennebec	357	105	" "
Katahdin	--	341	100	Thin- to thick-round
B 751-119	Between Kennebec and Katahdin	328	96	Like Kennebec

bushels per acre, 3 of them had light- or yellowish-green foliage, and all of them had tubers that were too small. Six yielded significantly lower than Katahdin. All 8 had 5.1 to 8.6 tubers per pound, compared with 3.7 to 4.5 tubers per pound for the 6 varieties in table 1. With 1 exception, the tuber size in each of 1 group was significantly different from the tuber size in each of the other group.

Correlations were calculated between number of stems, number of tubers, tuber size, and yield rate, for the 14 varieties, and resulted in the following conclusions: With more stems there were more tubers (significant); with more tubers the tubers were smaller (highly significant); with smaller tubers the yield was less (highly significant); with more stems the tubers were smaller and the yield was less; with more tubers, the yield was less. In general, a variety was less desirable with respect to tuber size and yield rate if it had more stems.

The pedigrees of the three best seedling varieties follow.

```

                (Imperia
      (B24-58...(Earlaine
B 751-119...(
      (Teton....(45146
                (Earlaine

                (96-56....(3895-13
      (B355-44...(          (Earlaine
      (          (
B2938-22...(          (336-144...(President
      (          (Katahdin
      (
      (          (792-94...(41956
      (B522-33...(          (Earlaine
      (
      (1241-91...(Katahdin selfed

                (Houma....(Katahdin
      (          (Charles Downing
      (B864-17...(
      (          (X247-48...(Kepplestone Kidney
      (          (Earlaine
B2983-17...(
      (          (Houma....(Katahdin
      (          (Charles Downing
      (B986-7...(
      (792-94  (41956
                (Earlaine
  
```

The frequency of Earlaine in these pedigrees is of interest, especially in view of the statement that Earlaine is "very susceptible to leaf roll" (U.S. Dept. Agr. Circ. 741, rev. 1951, by C. F. Clark and P. M. Lombard).

MAINE

Kenneth F. Nielsen, Robert V. Akeley, and Charles E. Cunningham

Potato Variety Trial

The annual potato variety trials to obtain data on the yield potential and specific gravity of various potato varieties were continued in Maine in 1953. The trials were conducted on farms at four different locations in the State: Exeter, Houlton, Presque Isle, and Madawaska.

A total of 21 varieties were included in the tests, 11 of them named and 10 unnamed. Included either for the first time or for the first time in the past few years were 5 of the named and 6 of the unnamed varieties. Standard named varieties were included so that there might be some basis of comparison by which to judge the newer ones. Nielsen table 1 gives some information about the varieties tested.

Approximately 1,400 pounds per acre of an 8-12-12 fertilizer was applied to the plots at each farm.

With the exception of the Russet Burbank the seed pieces of the varieties were spaced 8 inches apart. The Russet Burbank seed was spaced at 10-inch intervals. The rows were 34 inches apart and 26 feet long with 4-foot alleys between replicates. There were 4-replicates at each location and the varieties were randomly placed in each replicate.

Statistical analyses were made on all the yield and specific gravity data.

Yields

Harvest yields are one of the most important factors in testing a potato variety. Total yields of the varieties at each farm are given in Nielsen table 2 in order of their average yield.

Differences in the weather and the soil have a great influence on yields and specific gravity. This can be seen in Nielsen table 2. Recent experimental work indicates that potato yields would benefit from supplemental moisture (irrigation) in at least 3 out of 4 years in Maine. There was more moisture at Madawaska and less at Exeter than at the other two locations. Moisture supply undoubtedly influenced the yield level at the different places. None of the plots was irrigated.

It is difficult to estimate the performance of a variety at a particular location on the basis of its yield at another. Yet it can be seen that the varieties were in about the same relative position at all 4 locations on the basis of yield. For that reason, it is possible to use averages from different places to judge a variety's geographical adaptability.

Nielsen table 1. Important characteristics of varieties in the 1953 tests.

Variety	Matu- rity	Skin color	Sp. Gr.*	Disease Resistance
Canso	Late	Wh.	H	L. bl., virus A
Cherokee	Med.	"	M	L. bl., scab, virus A, net necrosis
Gr. Mt.	Late	"	H	None
Katahdin	"	"	M	Net necrosis, virus A, sl. leaf roll.
Kennebec	"	"	H	L. bl., net necrosis, virus A
Keswick	"	"	H	L. bl.
Ontario	"	"	L	Scab, sl. l. bl.
Pontiac	"	Red	M	Virus A
Pungo	Med.	Sl.rus.	M	L. bl., virus A
R. Burbank	Late	Rus.	H	Scab
Teton	"	Wh.	M	Ring rot, virus A
B2368-11	Med.	Red	L	Scab
B 2368-4	Late	"	M	Scab
B 2187-25	"	Wh.	M	Leaf roll
B 859-10	Med.	"	H	Leaf roll
B 751-119	Late	"	H	Leaf roll
B 73-18	Med	"	H	L. bl.
B 606-67	"	"	H	L. bl. net necrosis, virus A x X
B 515-2	Early	Sl.rus.	M	Scab
B 355-44	Late	Wh.	H	L. bl., ring rot, virus A, net necrosis
B 355-35	"	"	M	L. bl., ring rot, virus A, net necrosis

*H = high; M = medium; L = low.

Nielsen table 2. Total yield per acre by location.

Variety	Location and yield per acre				
	Exeter	Houlton	Presque Isle	Madawaska	Average
	Bu.	Bu.	Bu.	Bu.	Bu.
Pontiac	432	568	560	581	535
B 2368-4	361	538	613	565	519
Teton	392	569	506	606	518
Kennebec	372	566	540	568	512
B 606-67	437	515	437	652	510
Gr. Mountain	341	564	520	581	502
Ontario	329	554	537	583	501
Katahdin	319	579	486	548	483
B 355-35	335	510	485	543	468
Pungo	370	470	457	550	462
B 2368-11	317	494	436	514	440
12 Rus. Burbank	338	468	358	525	422
Canso	264	457	432	528	420
B 751-119	327	442	381	508	415
Keswick	263	416	397	586	413
B 355-44	277	431	475	459	411
Cherokee	298	451	381	504	409
B 73-18	270	419	419	450	390
B 859-10	217	447	398	491	388
B 2187-25	264	432	347	484	382
B 515-2 (E. Gem)	242	451	336	455	371
Average	322.1	497.2	452.6	537.2	
L.S.D. at .05	78	61	68	68	

In spite of its importance, a high yield isn't necessarily an indication that a variety should be grown for table stock purposes. The tubers may be misshapen or be of low specific gravity, or have other undesirable characteristics. Ontario, for example, is a high yielder, but is poor in cooking quality and is, therefore, not extensively grown. Seedling B 606-67 has both high-yielding capacity and high specific gravity. Because of this, it is of interest to those who are concerned with total starch production. Under varying environmental conditions, however, it has a tendency to form off-type tubers and therefore wouldn't be too desirable for table stock production.

The two varieties Canso and Keswick were developed in Canada. Both are resistant to late blight. In the trials some poor Keswick seed was planted, resulting in a poor stand and decreased yield. However, both varieties have good-shaped tubers, the Canso being slightly superior under our conditions.

Teton yielded well at all locations. It was released in Wyoming and grown in Maine several years ago because of its resistance to ring rot. The tubers are similar to Katahdin in appearance.

Russet Burbank yields were below average at all locations excepting Exeter. It is believed that this was due to spacing the seed pieces too close together. Instead of the 10-inch spacing which was used, experience indicates 14 to 22 inches is best. The variety sets well and the tubers are long, hence the wider spacing is needed.

One of the poorer features of the variety is the tendency to form misshapen tubers. It is sensitive to moisture supply and there is always the danger of second growth upon the addition of water following a dry spell. Under irrigation this danger is considerably reduced. The variety doesn't need more moisture than most other varieties, but it does need a more uniform supply.

In addition to the Pontiac there were two other red varieties, seedlings B 2368-11 and B 2368-4. The latter had the better yield, but neither variety was very uniform in size and appearance.

Seedling B 515-2 has been named and released as Early Gem in the West. It is an early variety and has a tendency to russet. In these trials the tubers tended to be small, perhaps because of too close a spacing. Also, the yields were the lowest on the average.

Seedling B 355-35 had above average yields in these trials, comparing favorably with Katahdin. With its resistance to late blight and ring rot, there is a possibility of its having a place in the potato industry.

Grade Size Distribution

Nielsen table 3 shows the grade size distribution of the variety according to diameter. The following classes were used:

1. Smaller than 2" ($< 2''$)
2. 2" to 2 1/2"
3. 2 1/2" to 2 7/8"
4. 2 7/8" to 3 1/4"
5. Larger than 3 1/4" ($> 3 \frac{1}{4}''$)

According to a recent survey conducted by the University of Maine, Department of Agricultural Economics, consumers prefer a size 2 1/2" to 3" diameter. On an equal cost basis, this size is preferred about 4-1 over smaller ones, 2" to 2 1/2" diameter, and about 2-1 over larger ones, 3" to 3 1/2" diameter. For table stock production there is a market for the larger potatoes (larger than 3 1/2" diameter) as chef specials. However, the small ones (less than 2" diameter) are of little value for table stock.

Nielsen table 3. Percentage of total yield distribution of different grade classes.

Variety	Houlton					Exeter				
	Under 2"	2-2 1/2"	2 1/2- 2 7/8"	2 7/8- 3 1/4"	Over 3 1/4"	Under 2"	2-2 1/2"	2 1/2- 2 7/8"	2 7/8- 3 1/4"	Over 3 1/4"
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Canso	6.9	43.8	37.3	10.5	1.5	3.0	33.0	34.4	20.6	9.0
Cherokee	7.0	44.2	30.4	14.0	4.4	3.3	34.4	33.4	18.9	10.0
Gr. Mt.	5.1	30.4	29.2	27.1	8.2	4.4	30.4	32.7	17.7	14.8
Katahdin	4.9	29.0	34.9	21.4	9.8	2.0	17.8	26.9	29.2	24.1
Kennebec	3.7	31.5	35.2	21.6	8.0	1.6	15.9	24.9	33.0	24.6
Keswick	3.6	22.0	27.0	28.1	19.3	0.8	12.8	22.3	28.7	35.4
Ontario	5.5	39.8	35.5	14.9	4.3	3.9	33.2	28.4	21.3	13.2
Pontiac	2.9	22.6	25.7	31.4	17.4	1.6	12.8	13.3	30.0	42.3
Pungo	2.3	26.5	36.8	21.4	13.0	2.7	17.6	25.4	26.5	27.8
R. Burbank	12.2	72.3	14.7	0.8	0	5.2	41.7	34.4	10.8	7.9
Teton	3.5	32.6	24.4	21.7	7.8	4.8	21.2	28.2	29.0	17.8
B2368-11	9.2	33.2	35.2	14.9	7.5	5.1	28.4	25.2	24.6	16.7
B2368-4	2.4	24.3	33.7	29.0	10.6	1.4	16.6	20.4	27.1	34.5
B2187-25	5.5	43.5	28.2	12.5	10.3	2.6	23.9	31.3	27.6	14.6
B859-10	9.7	71.2	18.0	1.1	0	5.5	46.3	36.7	8.7	2.8
B751-119	5.6	35.6	30.5	22.0	6.3	10.3	36.1	30.7	14.5	8.4
B73-18	2.1	18.4	40.0	28.7	10.8	1.1	10.2	17.1	26.5	45.1
B606-67	4.6	42.5	38.7	12.1	2.1	0.9	15.4	27.8	29.6	26.3
B515-2	4.4	46.7	32.1	12.9	3.9	0.8	29.1	45.9	15.2	9.0
B355-44	3.6	37.4	35.5	18.9	4.6	2.1	24.9	22.1	23.8	27.1
B355-35	5.8	42.9	34.4	14.3	2.6	3.0	22.8	32.5	28.7	13.0
	Presque Isle					Madawaska				
	Under 2"	2-2 1/2"	2 1/2- 2 7/8"	2 7/8- 3 1/4"	Over 3 1/4"	Under 2"	2-2 1/2"	2 1/2- 2 7/8"	2 7/8- 3 1/4"	Over 3 1/4"
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Canso	5.5	40.3	38.5	15.5	0.2	5.0	38.8	37.4	14.7	4.1
Cherokee	7.8	48.4	30.8	11.3	1.7	4.9	35.2	38.6	17.2	4.1
Gr. Mt.	4.2	25.9	38.1	29.4	2.4	2.7	25.6	41.8	22.9	7.0
Katahdin	3.9	32.7	37.0	24.3	2.1	5.1	27.7	31.5	24.4	11.3
Kennebec	2.0	15.7	28.2	35.8	18.3	4.7	28.8	34.0	21.9	10.6
Keswick	4.0	18.4	26.3	31.5	19.8	3.7	21.2	24.8	25.9	24.4
Ontario	4.9	39.8	31.6	18.0	5.7	4.7	37.6	36.6	16.2	4.9
Pontiac	4.2	40.2	29.9	19.7	6.0	2.6	18.3	22.6	30.1	26.4
Pungo	2.2	33.7	33.9	23.3	6.9	2.2	23.5	31.2	24.1	19.0
R. Burbank	9.4	73.3	16.5	0.8	0	9.0	64.2	19.5	5.6	1.7
Teton	1.2	26.6	33.5	25.3	13.4	2.3	32.2	26.5	31.6	7.4
B2368-11	6.8	56.9	24.2	9.0	3.1	6.3	36.1	37.2	14.7	5.7
B2368-4	0.6	11.8	18.5	31.7	37.4	2.4	15.7	26.2	26.2	29.5
B2187-25	6.2	48.4	28.1	13.0	4.3	5.3	23.7	26.9	22.4	21.7
B859-10	12.9	70.0	15.6	1.2	0.3	8.4	53.9	29.9	6.8	1.0
B751-119	7.2	46.5	35.5	9.8	1.0	3.9	25.7	33.6	25.9	10.9
B73-18	1.9	21.2	38.8	32.0	6.1	3.9	25.4	28.4	25.7	16.6
B606-67	5.0	52.5	33.3	6.8	2.1	3.9	30.4	35.0	26.0	4.7
B515-2	5.8	55.5	32.8	4.7	1.2	4.3	39.3	40.8	13.8	1.8
B355-44	2.1	30.0	37.1	24.2	6.6	3.8	32.3	40.6	20.1	3.2
B355-35	6.5	46.1	38.8	8.5	2.1	5.6	36.2	35.6	16.2	6.4

The percentage of the total yield of tubers falling into a given grade size may vary considerably from place to place because of interacting environmental factors, even though the yield is the same. With more importance being placed on the marketing of potatoes, production practices are going to have to be modified to yield more tubers of marketable quality.

Our grading system was set up for round and slightly oblong tubers. As a result, longer varieties with smaller diameters, like Russet Burbank, fell into the lower grade size classes. This should be kept in mind when interpreting the results in table 3.

Specific Gravity (Total Solids)

Specific gravity measurements of potato tubers give a convenient index of the cooking quality. An increase of 0.005 in specific gravity reflects about 1% increase in starch content. With an increase in starch content there is a corresponding increase in mealiness. On the basis of this fact, there may be a convenient separation into about three classes of cooking methods according to specific gravity.

<u>Specific Gravity (Total Solids)</u>		<u>Cooking Methods</u>
1.060-1.069	(15.4-17.4)	Poor french fryers, poor bakers, fair boilers, good pan fryers.
1.070-1.079	(17.4-19.4)	Fair french fryers, fair bakers, good boilers, fair pan fryers.
1.080 and above	(19.7)	Good french fryers, good bakers, fair boilers, fair pan fryers.

At low specific gravity values the potatoes are soggy and cling when baked, but because of this they make good pan fryers and fair boilers. At high values the tubers are so mealy they cannot be handled well when boiled as they break down too easily. On the other hand, the more mealy the tuber, the better baker it is.

The specific gravity values of the varieties in 1953 were higher than those in the 1952 season, a general average of 1.0714 for 1952 compared with 1.0781 for 1953.

Conclusions

There are 4 main factors that are important in judging a variety: (a) yield-ing potential, (b) specific gravity, (c) appearance, and (d) disease resistance. In the trials we are more concerned with the first 3. Relative to other varieties included in the trials, any particular variety seems to perform about the same at the different locations. Hence the factors which influence a person's choice of varieties to be grown commercially include domestic demand, the possibility of disease in a given area which will emphasize particular resistance a variety may have, and experience which a grower has had with a variety under the conditions of his farm (soil and climatic factors) and his handling methods (cultural factors).

It is not the policy of the Experiment Station to publish recommendations for particular varieties. The accumulated data are presented along with a few comments on interpretation and passed on to individual growers who may exercise their own judgment in their selections.

Nielsen table 4. Total solids of varieties by location.

Variety	Exeter	Poultton	Presque Isle	Madawaska	Average
	Pct.	Pct.	Pct.	Pct.	Pct.
B 73-18	19.7	22.7	23.0	17.9	20.8 ^x
B 606-67	19.2	23.2	21.7	17.9	20.5 ^x
B 355-44	19.0	21.7	21.7	20.2	20.7 ^x
Canso	19.9	21.4	21.6	19.4	20.6 ^x
B 751-119	19.4	21.0	20.7	18.9	20.0 ^x
Gr. Mountain	17.4	21.0	21.6	17.9	19.5
Cherokee	19.4	21.0	20.7	18.2	19.8 ^x
Keswick	19.4	21.2	20.2	18.4	19.8 ^x
R. Burbank	18.2	21.0	20.7	19.2	19.8 ⁽⁷⁾
Pungo	18.4	21.7	20.7	17.9	19.7
B 2187-25	18.4	20.5	20.5	18.2	19.4
B 859-10	19.7	20.5	19.7	17.7	19.4
Kennebec	19.4	21.2	20.2	18.4	19.8 ^x
Katahdin	18.2	19.7	20.5	17.9	19.1
B 355-35	17.4	19.9	21.0	18.2	19.1
Teton	17.2	20.4	19.7	17.9	18.8
B 2368-4	17.2	17.9	17.9	17.4	17.6
Ontario	16.2	19.0	19.2	16.9	17.8
Pontiac	15.5	19.0	18.9	16.0	17.4
B 515-2(E. Gem)	17.2	17.4	17.4	16.0	17.0
B 2368-11	16.5	17.2	16.2	15.4	16.3
Average	18.2	20.5	20.2	18.2	19.3
L.S.D. at 0.05	1.4	1.1	1.1	1.4	
Planting date	May 29	May 28	May 9	May 27	
Harvest date	Oct. 1	Sept. 29	Sept. 16	Sept. 28	

MAINE

G. W. Simpson and Reiner Bonde

Leaf-Roll-Resistant Seedlings

Green peach aphids, fed for a period on leaf-roll Katahdin plants, were again used in testing for resistance to leaf roll. A total of 6,395 tubers from Beltsville were introduced onto Aroostook Farm in 1953. Twenty-four crosses and 9 selfed lines were represented. In addition, 420 selected seedlings or named varieties from the Chapman Farm were planted, each in 5-hill lots. Ten of these were from similar introductions made in 1952, while the rest represented, in addition to 11 named varieties, 31 crosses and 4 selfed lines.

Based on the expression of current-season symptoms of leaf roll, the results obtained in 1953 with the material from Beltsville were about as usual--532 hills (8.3% of the total growing) were saved for further testing. Of the 10 hills saved from the 1952 introductions from Chapman, 4 survived the second year's inoculation. Of the 1953 introductions from Chapman, none of the named varieties and only 4 of the others survived. One of these was from a selfed line, while the rest represented 3 different crosses. Three of these 4 had been selected in previous years as being leaf-roll-resistant.

The russet, scab-resistant seedling B 2834-3 showed no evidence of current-season leaf roll again in 1953 and is being increased as rapidly as possible for further testing. Seedling B 2925-45 is also being increased so that its yielding ability can be determined. Both of these seedlings have one resistant parent.

The seedlings indicated as saved for retesting in Simpson-Bonde table 1 of the 1952 report were planted but not reinoculated. It will not be known whether or not they have leaf roll until they are replanted in 1954.

Results since the 1950 introductions are given in Simpson-Bonde tables 1 to 4, inclusive.

Simpson and Bonde table 1. Reaction of progenies of different crosses to leaf roll infection resulting from artificial inoculations with viruliferous green peach aphids in each of 4 successive seasons, 1950 - 53.

Pedigree	Parentage	Seedlings planted 1950 <u>1/</u>	Replanted			Saved for retesting in 1954
			1953	1952	1951	
		No.	No.	No.	No.	No.
B 2834	B 294-38 x X157-9	230	1	5	54	1
B 2925	X1276-185 x B 76-23	275	3	17	49	1
B 2931	Empire x B 872-70	107	5	11	20	3
B 2937	Virgil x B 522-33	102	3	3	13	1
B 2939	B 583-66 x B 582-33	190	19	35	88	8
B 2940	B 584-11 x B 1122-25	44	3	3	15	1
B 2941	B 673-76 x B 1122-25	224	18	21	76	12
B 2943	Aquila x Triumph	28	1	1	2	1
B 2949	B 420-174 x Triumph	204	6	12	39	1
B 2958	B 583-66 x B 986-7	212	40	48	83	10
B 2959	B 583-67 x B 872-70	172	9	16	41	7
B 2965	B 876-63 x B 986-7	283	9	10	28	4
B 2971	B 574-14 x B 872-70	230	11	18	36	6
B 2976	B 583-66 x B 872-70	292	36	56	71	24
B 2977	B 583-67 x B 578-39	179	15	24	52	2
B 2983	B 864-17 x B 986-7	78	4	9	26	2

1/ 65 crosses were introduced in 1950.

Simpson and Bonde table 2. Reaction of progenies of different crosses and selfed lines to leaf roll infection resulting from artificial inoculation with viruliferous green peach aphids in each of 3 successive seasons, 1950-53.

Pedigree	Parentage	Seedlings planted in 1951 <u>1/</u>	Replanted		Saved for retesting in 1954
			1953	1952	
		No	No	No	No.
B 1339	B 515-14 selfed	63	6	17	2
B 3095	Houma x Triumf	713	25	46	2
B 3115	B 514-14 x Triumf	595	12	35	1
B 3118	B 572-92 x B 446-8	378	2	8	1
B 3119	B 583-66 x B 578-39	355	13	18	2

1/ 20 crossed and 2 selfed lines introduced in 1951.

Simpson and Bonde table 3. Reaction of progenies of different crosses to leaf roll infection resulting from artificial inoculation with viruliferous green peach aphids in each of 2 successive seasons, 1952-1953.

Pedigree	Parentage	Seedlings planted in 1952 <u>1/</u>	Replicated 1953	Saved for retesting in 1954	Surviving 2 inoculations
		No.	No.	No.	Pct.
B 3291	B 579-11 x B 606-3	446	35	5	1.1
B 3292	B 579-11 x B 608-66	249	42	11	4.4
B 3293	B 579-11 x B 754-16	171	28	10	5.8
B 3295	B 579-11 x B 936-12	550	37	6	1.1
B 3296	X 927-3 x B 936-12	77	17	1	1.3
B 3302	B 2081-14 x B 936-12	360	105	4	1.1

1/ 16 crosses were introduced in 1952.

Simpson and Bonde table 4. Reaction of progenies of different crosses and selfed lines to leaf roll infection resulting from artificial inoculations with viruliferous green peach aphids in 1953.

Pedigree	Parentage	Seedlings planted in 1953	Saved for retesting in 1954	Surviving the first year's test
		No.	No.	pct.
B 1382	Katahdin selfed	130	0	--
B 1383	B 24-58 "	214	37	17.3
B 1384	B 784-53 "	172	51	29.7
B 1385	B 859-10 "	66	12	18.2
B 1386	B 864-2 "	308	16	5.2
B 1387	B 936-12 "	432	0	--
B 1388	B 2113-9 "	83	12	14.5
B 1389	B 2946-5 "	52	0	--
B 1390	Ac25813 "	59	0	--
B 3387	B 24-58 x Katahdin	159	16	10.1
B 3388	B 784-53 x "	236	27	11.4
B 3389	B 784-53 x B 24-58	58	20	34.5
B 3390	B 859-10 x Katahdin	226	33	14.6
B 3391	B 859-10 x B 24-58	347	135	38.9
B 3392	B 2187-25 x Katahdin	178	11	6.2
B 3393	B 2187-25 x B 24-58	232	44	19.0
B 3394	B 864-2 x Katahdin	367	2	0.5
B 3395	B 864-2 x B 936-12	382	1	0.3
B 3396	B 2113-9 x Katahdin	366	13	3.6
B 3397	B 2113-9 x B 864-2	286	27	9.4
B 3398	Ac 25813 x B 864-2	285	2	0.7
B 3399	Ac 25813 x B 2113-9	201	2	1.0
B 3400	B 24-58 x B 922-3	166	16	9.6
B 3412	Kennebec x B 864-2	320	7	2.2
B 3435	B 780-27 x B 936-12	302	1	0.3
B 3437	B 864-2 x B 2067-52	187	0	---
B 3447	Ac 25934 x Katahdin	171	0	---
B 3484	Ac 25830 x B 2429-92	51	3	5.9
B 3485	B 595-76 x Katahdin	16	0	---
B 3486	B 595-76 x B 24-58	121	8	6.6
B 3488	B 606-37 x B 24-58	70	8	11.4
B 3489	B 2925-23 x Katahdin	80	4	5.0
B 3490	B 2925-23 x B 24-58	72	24	33.3
		6 395	532	8.3

MARYLAND

(University of Maryland Vegetable Research Farm, Salisbury, Md.)

James G. Kantzes and Carroll E. Jox

Performance of Certain Disease-Resistant Varieties and Seedlings of Potatoes, with and without Fungicidal Sprays, in Maryland, 1953.

Procedure and Results:

The purpose of these studies was to compare certain potato varieties and seedlings that possess resistance to certain destructive diseases with standard varieties for their adaptability to Maryland and also to observe the effect on yield in plots receiving fungicide-insecticide sprays in comparison with those receiving insecticidal sprays only on early and late potatoes.

The early and late plantings were made at the University of Maryland Vegetable Research Farm at Salisbury, Md. A split plot design was used; half of the plot was sprayed with a fungicide-insecticide spray (zineb 2 lb. + *DDT oil emulsion 1 qt. per 100 gal.) whereas the other half was sprayed with the insecticide only.

All the seed used in these plots was certified with the exception of those varieties and seedlings obtained from Maryland sources.

Early Planting. Nineteen varieties and seedlings were planted on March 21, 1953, in a randomized block design of eight replications. Each replication consisted of a 30-foot row of each of the varieties and seedlings. The cut untreated seed pieces were planted with a mechanical planter in rows 32 inches apart with approximately 14 inches between seed pieces in the row. Fertilizer was applied with the planter at time of planting and additional fertilizer was applied as side dressing during the growing season in accordance with the best horticultural practice in the area.

The first application of sprays was made on May 7. There were a total of 8 applications made at approximately weekly intervals. They were applied with a power sprayer (approximately 350 p.s.i. at the pump) at the rate of approximately 200 gal./acre per application through a 6-nozzle-per-row boom.

Weather conditions were favorable for growth of the early crop and yields were satisfactory for that part of the State.

Early blight was the only foliar disease that was present in the early plots. It developed slowly and caused relatively little damage until almost harvest-time. It was not until this time that any beneficial effect in control of

* 30% emulsifiable concentrate

early blight as a result of the application of fungicide could be observed.

The early plots were harvested on July 30. Just previous to harvest, observations were made on relative maturity of the varieties and seedlings as judged by conditions of the tops in the fungicide-sprayed plots. Red Warba matured first followed by Irish Cobbler, seedling 1276-185, Cherokee, Marygold, La Soda, seedling B 75-4, and Pontiac; the tops were dead when harvested. At this time the tops of the remaining varieties were partially green. In the plot that received no fungicide (insecticide only) all the tops of the plants were dead with the exception of the variety Ontario and the seedling B 355-44, which were partially green when harvested.

Md. table 1 shows the yields of the varieties and seedlings in the early plots. Statistical analysis of the data showed that the relationship between yields of the various seedlings and varieties remained essentially the same whether they received fungicide or not, but that total yields from plots sprayed with fungicide-insecticide were significantly greater than those from plots sprayed with insecticide alone. The varieties Pungo, La Soda, Marygold, and seedling B 606-37 produced yields of No. 1's which were significantly better than that of the certified (Maine) Irish Cobbler in the plots that were sprayed with a fungicide. There was no significant difference in yield of No. 1's between any of the other varieties and the certified Irish Cobbler. Where no fungicide was applied the variety La Soda and the seedling B 606-67 produced yields of No. 1's which were significantly better than that of the certified Irish Cobbler, but Irish Cobbler and seedling 1276-185 from home-grown seed and seedling B 75-4 were poorer than certified Irish Cobbler in this respect.

Late Planting. Twenty varieties and seedlings were planted on July 11 in a randomized block design of eight replications. The planting plan and procedure were essentially the same as that employed with the early planting.

The first application of sprays was made on August 8. A total of 8 applications were made at approximately weekly intervals.

Weather conditions were extremely dry during the growing season and resulted in low yields. Although the weather was dry, early blight appeared early in the plots and caused heavy defoliation, especially in the plot with no fungicide (Md. table 3). Late blight was not present at any time during the season.

All the plots were harvested on November 5 and the yield data recorded (Md. table 2). The data were analyzed in the same manner as that from the early planting and again showed that the relationship between yields of the various seedlings and varieties remained essentially the same whether they received fungicide or not, but that the total yields from plots sprayed with fungicide-insecticide were significantly greater than those from plots sprayed with insecticide alone. The variety Kennebec and seedling B 606-67 produced yields of No. 1's which were significantly better than that of the certified Irish Cobbler in the plots sprayed with a fungicide. But the certified Irish Cobbler produced yields of No. 1's which were greater than those of certified Red Warba and Cherokee and certified seedling B 75-4 and of the varieties Ontario, Irish Cobbler, and seedling 1276-185, all from home-grown seed. In the plots where no fungicide was applied the varieties Kennebec, Marygold, Sebago,

Katahdin, Pontiac, Pungo, and the seedlings B 606-67, B 355-44, and B 73-18 produced yields of No. 1's which were significantly better than that of the certified Irish Cobbler. The certified Irish Cobbler produced yields of No. 1's which were significantly better than that of the certified seedling B 75-4 and the seedling 1276-185 from home grown seed.

The amount of defoliation of all the varieties and seedlings from early blight on four different dates is shown in Md. table 3. The beneficial effect of the fungicide in controlling early blight is apparent. The incidence of early blight on the variety B 355-44 was markedly less than on any of the other varieties and seedlings in the plots.

Md. table 1. Yield of potatoes in early plots at the University of Maryland Vegetable Research Farm, Salisbury, Md., 1953.

Variety or seedling	Fungicide + Insecticide 1/ Average yield per acre				Seed source
	U.S. #12/	U.S. #22/	Total	U.S.#1 to total	
	Bu.	Bu.	Bu.	Pct.	
Pungo	354	29	383	90	Maine
La Soda	348	40	388	92	Nebraska
Marygold	308	24	332	93	Maine
B 606-67	303	55	358	85	"
Pontiac	260	36	296	88	"
Sebago	260	40	300	87	"
Katahdin	255	26	281	91	"
Red Warba	254	53	307	83	"
B 355-44	249	34	283	88	"
Kennebec	245	44	289	85	"
B 73-18	239	33	272	88	"
Irish Cobbler	224	49	273	82	"
Cherokee	221	54	275	80	"
B 75-4	213	32	245	87	"
1276-185	208	41	249	84	Salisbury, Md.
Irish Cobbler	195	48	243	80	"
Ontario	183	84	267	69	Garrett Co., Md.
1276-185	183	36	219	84	" "
Kennebec	176	22	198	89	Salisbury, Md.
L.S.D. at 5%	75	24	75	---	
L.S.D. at 1%	98	31	97		

Md. table 1 continued

Variety or seedling	Insecticide				Seed source
	Average yield per acre				
	U.S. #1	U.S. #2	Total	U.S. #1 to total	
	Bu.	Bu.	Bu.	Pct.	
La Soda	336	46	382	88	Nebraska
B 606-67	295	48	343	86	Maine
Pontiac	281	47	328	86	"
Pungo	276	15	291	95	"
Ontario	273	36	309	88	Garret Co.,Md.
Marygold	260	46	306	85	Maine
Sebago	246	29	275	89	"
B 73-18	234	20	254	92	"
Irish Cobbler	223	45	268	83	"
B 355-44	220	38	258	85	"
Cherokee	218	40	258	84	"
Kennebec	211	26	237	89	"
Katahdin	195	17	212	92	"
Red Warba	191	46	237	81	"
1276-185	184	46	230	80	Garret Co.,Md.
Kennebec	166	26	192	87	Salisbury,Md.
B 75-4	157	17	174	90	Maine
Irish Cobbler	150	43	193	78	Salisbury,Md.
1276-185	141	40	181	78	"
L.S.D. at 5%	62	21	60	--	
" at 1%	81	28	78	--	

1/ Fungicide (zineb 2 lb/100 gal.) plus insecticide (DDT, oil emul., 1 qt./100 gal.)

2/ U.S. No. 1 and 2 equivalent, not officially graded.

Md. table 2. Yields of potatoes in late plots at the University of Maryland Vegetable Research Farm, Salisbury, Md., 1953.

Variety or seedling	Fungicide + Insecticide ^{1/}				Seed source
	Average yield per acre				
	U.S. #1 ^{2/}	U.S. #2 ^{2/}	Total	U.S. #1 total	
	Bu.	Bu.	Bu.	Pct.	
B 606-67	194	31	225	86	Maine
Kennebec	185	33	218	85	"
B 355-44	172	36	208	83	"
B 355-44	165	35	200	83	Salisbury, Md.
Marygold	156	42	198	79	Maine
B 73-18	146	34	180	81	"
Pungo	142	32	174	82	"
Irish Cobbler	141	36	177	80	"
Sebago	140	40	180	78	"
Pontiac	130	45	175	74	"
Katahdin	128	33	161	80	"
Kennebec	128	40	168	76	Salisbury, Md.
La Soda	122	45	167	73	Nebraska
Cherokee	103	44	147	70	Maine
Red Warba	97	43	140	69	"
Ontario	92	50	142	65	Garrett Co., Md.
1276-185	81	59	140	58	Salisbury, Md.
1276-185	57	55	112	51	Garrett Co., Md.
Irish Cobbler	52	50	102	51	Salisbury, Md..
B 75-4	49	29	78	63	" "
L.S.D. at 5%	37	17	35		
" at 1%	49	--	45		
Insecticide					
Kennebec	157	34	191	82	Maine
B 606-67	147	34	181	81	"
Marygold	139	33	172	81	"
B 355-44	137	35	172	80	"
B 73-18	129	30	159	81	"
Sebago	126	39	165	76	"
Katahdin	122	25	147	83	"
Pontiac	116	28	144	81	"
Pungo	111	47	158	70	"
B 355-44	100	35	135	74	Salisbury, Md.
Kennebec	98	33	131	75	"
La Soda	98	47	145	68	Nebraska
Ontario	87	60	147	59	Garret Co., Md.
Cherokee	84	49	133	63	Maine
Irish Cobbler	77	35	112	69	"
1276-185	59	48	107	55	Salisbury, Md.
Irish Cobbler	55	49	104	53	"
Red Warba	53	38	91	58	Maine
B 75-4	41	26	67	61	"
1276-185	23	44	67	34	Garrett Co., Md.
L.S.D. at 5%	26	14	27		
" " 1%	34	18	35		

1/ Fungicide (zineb 2 lb/100 gal.) plus insecticide (DDT, oil emul., 1 qt/100 gal.)

2/ U.S. No. 1 and No. 2 equivalent, not officially graded.

Md. table 3. Foliage score and percentage of defoliation of sprayed* and unsprayed* late potato test plots at the University of Maryland Vegetable Research Farm, Salisbury, Maryland, 1953.

Variety or seedling	September 25				October 2				Seed source	
	Sprayed		Unsprayed		Sprayed		Unsprayed			
	Score	Defol.	Score	Defol.	Score	Defol.	Score	Defol.		
		Pct.		Pct.		Pct.		Pct.		
B 606-67	2.3	8	3.0	12	2.5	9	3.0	12	Maine	
Marygold	2.3	8	3.5	17	2.8	11	3.5	17	"	
Kennebec	2.0	6	3.3	15	2.0	6	3.3	15	"	
B 73-18	1.5	4	1.3	3	2.0	6	2.3	8	"	
Pungo	2.5	9	4.3	28	3.5	17	4.3	28	"	
I. Cobbler	3.5	17	8.3	90	4.0	24	8.3	90	"	
Red Warba	4.5	31	8.8	93	4.8	37	8.8	93	"	
Cherokee	2.3	8	3.5	17	2.5	9	3.5	17	"	
B 355-44	1.0	2	1.3	3	1.5	4	1.3	3	"	
B 75-4	3.8	21	7.3	81	4.3	28	7.3	81	"	
Katahdin	2.0	6	3.0	12	2.5	9	3.0	12	"	
Sebago	1.5	4	1.3	3	1.8	5	1.3	3	"	
Pontiac	2.8	11	4.0	24	3.0	12	4.0	24	"	
1276-185	2.3	8	7.0	77	3.5	17	7.0	77	Garrett Co.,Md.	
Ontario	1.5	4	1.5	4	2.0	6	1.5	4	"	
I. Cobbler	3.0	12	5.8	56	3.5	17	5.8	56	Salisbury,Md.	
Kennebec	2.0	6	2.0	6	2.3	8	2.0	6	"	
B 355-44	1.0	2	1.0	2	1.0	2	1.0	2	"	
1276-185	2.5	9	6.5	69	3.3	15	6.5	69	"	
La Soda	4.3	28	6.0	60	4.5	31	6.0	60	Nebraska	
L.S.D. at 5%	.6		.92		.74		.74			
" " 1%	.78		.2		.96		.96			
		October 9					October 23			
B 606-67	3	12	8.3	90	7.5	83	11	100	Maine	
Marygold	3.0	12	9.8	97	6.3	65	11	100	"	
Kennebec	2.3	8	8.5	92	6.5	69	11	100	"	
B 73-18	2.0	6	7.0	77	6.8	74	11	100	"	
Pungo	3.8	20	8.5	92	7.5	83	11	100	"	
I. Cobbler	4.8	37	11.0	100	9.8	97	11	100	"	
Red Warba	6.0	60	11.0	100	10.3	98	11	100	"	
Cherokee	2.5	9	8.0	88	5.0	41	11	100	"	
B 355-44	1.8	5	4.3	28	3.3	15	11	100	"	
B 75-4	5.8	56	11.0	100	10.0	98	11	100	"	
Katahdin	3.0	12	8.0	88	5.8	56	11	100	"	
Sebago	2.3	8	5.3	46	4.5	32	11	100	"	
Pontiac	2.0	12	9.8	97	5.8	56	11	100	"	
1276-185	2.0	41	10.5	99	9.5	96	11	100	Garrett Co.Md.	
Ontario	2.0	8	5.0	41	3.8	21	11	100	"	
I. Cobbler	3.5	17	10.8	100	8.0	88	11	100	Salisbury, Md.	
Kennebec	2.3	8	5.8	56	5.0	41	11	100	"	
B 355-44	1.0	2	3.3	15	2.8	11	9.5	96	"	
1276-185	4.8	37	11.0	100	9.5	96	11	100	"	
La Soda	4.0	37	11.0	100	9.3	96	11	100	Nebraska	
L.S.D. at 5%	.58		1.16		1.2					
" " 1%	.75		1.51		1.56					

*Sprayed-Fungicide (zineb) plus insecticide (DDT) in all sprays
 Unsprayed - Insecticide only in all sprays.

MASSACHUSETTS
Karl Koch
Eastern States Farmers' Exchange

In each of 4 trial plots located in 4 different geographical areas 12 varieties of potatoes were planted to determine the varieties best suited for each location.

Of these plots 3 were located in Pennsylvania and 1 in Massachusetts. Each plot was located in a commercial grower's potato field and was cultivated and sprayed in the same operation as that for his own potatoes. The plot design was of the randomized type, 12 rows wide and 120 feet long, divided in 4 blocks 30 feet long. Each lot consisted of a single 30-foot row.

The fertilizer and cropping practices followed by each cooperator were:

The Clark Brothers farm located near Westfield, Mass., consists of a sandy loam soil. The land on which the plot was located was in cabbage the previous year. Late that summer, the field was sown with a rye covercrop which was harvested in the fall. The plot was fertilized with 1,800 pounds per acre of 8-16-16 which was placed in bands in the row at planting time. This plot was planted on May 14 and dug September 30.

The Fred Oswald farm is near New Tripoli, Pa. The field in which the plot was located consists of a shaly soil. The previous year this field was planted to potatoes. Before planting it was topdressed with 10 tons of manure to the acre and the plot was fertilized with 900 pounds per acre of 8-12-12 placed in the row at planting time. Later 350 pounds per acre of 8-12-12 was applied to the row as a side-dressing. The plot was planted on May 28 and dug October 8.

The Richard Zook farm is in the vicinity of Manheim, Pa. The soil in the field in which the plot was planted consisted of a clay loam type. For the past 3 years this field had been in alfalfa. At planting time the plot was fertilized at the rate of 2,000 pounds per acre of 5-10-10 placed in the row and was top-dressed later with 500 pounds per acre of 0-12-12. The plot was planted April 21 and dug October 7.

The Fred Bloom farm is near Ebensburg, Pa., and is of a shaly type soil. The field in which the plot was planted was in clover and peas the previous year. The plot was fertilized at the rate of 2,000 pounds per acre of 8-16-16 in bands in the row. This plot was planted May 27 and dug October 9.

The information obtained from these plots on yield, tuber type, and starch content is given in Koch tables 1, 2, and 3.

Potato Varieties Included in
Eastern States Test Plots 1953

- Source: United States Department of Agriculture
 Houma -Late, resistant to verticillium wilt.
 Pungo -Early, resistant to late blight.
 Red Pontiac -Early.
 Teton -Late, resistant to ring rot.
 B 606-67 -Late, resistant to late blight, X and A virus immune.
- Source: University of Nebraska
 White Cloud -Early, good quality.
- Source: Starks Farms, Wis.
 Chippewa -Medium early, high-yielding strain.
 Russet Sebago - Late, good quality and yield.
- Source: Eastern States Farmers' Exchange
 Cobbler, Chippewa, Katahdin, Sebago.

Koeh table 1. Observations on the type of tubers produced by the potato varieties in the Eastern States test plots, 1953.

Variety	Location and tuber type			
	Westfield, Mass (Clark)	New Tripoli, Pa (Oswald)	Manheim, Pa. (Zook)	Ebensburg, Pa. (Bloom)
Pontiac	Good	Good	Fair	Fair
B 606-67	Poor	Poor	Poor	Poor
Teton	Good	Good	Good	Good
Pungo	"	"	"	Fair
Wis. Chippewa	"	"	"	Good
E.S. Chippewa	"	"	"	"
Katahdin	"	"	"	"
Cobbler	Fair	"	Fair	"
Houma	Good	"	"	"
White Cloud	"	"	Good	"
E. S. Sebago	"	"	"	"
Russet Sebago	"	"	"	"

Koch table 2. 1953 potato variety test on four locations in Eastern States Territory

Variety	Yield per acre U.S. No. 1 size									
	Clark		Oswald		Zook		Bloom		Average	
	Bu	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.
Pontiac	835	95	306	88	353	74	461	96	489	89
B 606-67	605	96	248	80	307	72	472	96	408	88
Teton	614	94	197	66	336	80	417	92	391	86
Pungo	538	95	148	77	358	87	403	94	361	90
Wis. Chippewa	556	93	217	78	273	72	393	93	360	86
E.S. "	547	95	162	78	249	79	390	92	337	89
Katahdin	526	96	184	88	298	81	275	92	321	90
Cobbler	540	95	154	88	216	76	353	92	316	89
Houma	437	85	118	66	255	77	395	88	301	82
White Cloud	466	97	171	81	198	74	354	92	297	88
E.S. Sebago	366	82	190	80	276	74	324	88	289	83
Russet Sebago	351	97	171	81	295	78	288	88	276	85
L.S.D. 5%	160		40		98		76		9	
F	5.3		13.2		2.2		5.4		335	

Koch table 3. Percentage solids in potato varieties in four locations in 1953

Variety	Location and percentage solids					
	Westfield, Mass. (Clark)	New Tripoli, Pa. (Oswald)	Manheim, Pa. (Zook)	Ebensburg, Pa. (Zook)	Solids	Starch
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Houma	18.9	20.5	17.9	20.6	19.5	13.7
Pungo	18.4	21.9	16.7	20.7	19.4	13.7
Cobbler	17.4	20.2	17.7	19.7	18.8	12.9
Teton	17.6	17.2	18.6	20.2	18.4	12.7
E.S. Chippewa	16.2	18.4	19.2	19.4	18.3	12.5
Katahdin	17.4	17.9	18.0	19.7	18.3	12.5
White Cloud	17.4	17.6	18.2	19.2	18.1	12.2
B 606-67	18.7	17.5	15.0	20.2	17.9	12.1
Russet Sebago	16.5	16.7	17.4	19.7	17.6	11.7
Wis. Chippewa	16.2	17.5	17.3	19.1	17.5	11.7
Pontiac	15.8	15.9	19.0	18.4	17.3	11.5
E.S. Sebago	16.4	16.7	16.2	19.5	17.2	11.4
L.S.D. 5%	44.8	47.3	60.9	53.4		

1/ Percentage solids based on specific gravity determinations.

MASSACHUSETTS

Karl J. Kucinski and Ralph w. Donaldson

Fourteen varieties of potatoes were tested in 1953 for comparative yields at the Massachusetts Agricultural Experiment Station, Amherst, Mass. Tractor and sprayer rows were discarded. Each variety was planted in 200-foot single-row plots. One ton per acre rate of 6-8-8-2 was used applied in drill. Plots were sprayed at weekly intervals using 10-5-100 bordeaux mixture. The 1953 growing season was considered a subnormal potato year due to drought.

The results of this test are given below.

Total yield rank	Variety	Yield per acre			Total solids	Quality rank
		Size A	Size B	Total		
		Bu.	Bu.	Bu.		
1	B 606-67	458	10	468	19.2	3
2	Gr. Mountain	448	17	465	21.1	1
3	Teton	363	18	381	16.7	11
4	B 2368-3	358	18	376	18.2	6
5	Pungo	327	12	339	17.9	8
6	Cobbler	312	7	319	18.4	5
7	Kennebec	293	17	310	18.5	4
8	Sebago	262	15	277	16.3	13
9	Katahdin	255	12	267	17.4	10
10	Chippewa	253	8	261	16.2	12
11	B 2368-11	232	25	257	15.0	14
12	B 355-44	227	10	237	18.2	7
13	B 73-18	213	8	221	20.2	2
14	Cherokee	163	10	173	17.7	9

MICHIGAN
J. H. Muncie

Approximately 15,000 first-year seedlings from 43 crosses in the greenhouse were grown in the field at the Lake City Experiment Station. Parents in these crosses had shown resistance to both scab and Fusarium solani var. eumartii in previous field trials. Selections from these will be field-tested for resistance in 1954.

Field testing of advanced seedlings continued on plots infested with the scab organism and Fusarium solani var. eumartii. In the Fusarium plots, 5-hill lots of seedlings many of them replicated, were grown under irrigation to insure heavy infection. Sources of these lots of seedlings were: E. J. Wheeler, 195; F. J. Stevenson, U.S.D.A., 59; H. O. Werner, Nebraska, 11; F. A. Krantz, Minnesota, 9; C. E. Peterson (U.S.D.A.) Iowa, 1; J. H. Schultz, North Dakota, 1; and 50 of the writer's selections, a total of 326.

Reactions of these selections on the basis of stem-end cut-tuber tests are given in Mich. table 1.

Mich. table 1. Reaction of potato seedlings to Fusarium solani var. eumartii in the field, 1953.

Infection class	Seedlings in each class							
	Wheeler	U.S.D.A.	Minn.	Nebr.	Iowa	N. Dak.	M.S.C. B.P.	Total
Pct.	No.	No.	No.	No.	No.	No.	No.	No.
0	6						1	7
5	3	1						4
10	7	1		1			2	11
15-25			2	3				5
30-40	60	24	1	4		1	14	104
45-55	67	9	3	3	1		22	105
60-70	35	14	1				7	57
75-85	12	10					4	26
90-100	5		2					7
Total	195	59	9	11	1	1	50	326

In the scab plots 139 advanced-line seedlings were grown with Chippewa as a check in each third row. Reaction of these seedlings to scab infection by class is shown in Mich. table 2.

Mich. table 2. Reaction of potato seedlings to scab infection in the field, 1953.

Source	Selection	Seedlings infected					
		Type of scab lesion					
		0	1	2	3	4	5
U.S.D.A.	6		3	0	1	1	0
M.S.C. -B.P.	133	15	73	23	8	8	6

MICHIGAN

N. R. Thompson, E. J. Wheeler and H. C. Moore

The open fall this season compensated for the hot weather of August and early September to make the 1952 potato season successful. When rainfall was dificient supplemental irrigation was available.

Plan of work:

1. Crosses made by using selected parent stock from previous years.
2. Growing small tubers from hybrid seed in $3\frac{1}{2}$ -inch clay pots.
3. Two-acre plot from seedling tubers in the greenhouse.
4. Increase plots of promising seedlings.
5. Scab test.
6. North Central States Potato Breeder and Pathology advanced seedling yield and performance test.
7. Dates-of-planting and irrigation studies.
8. Provide seedlings for Fusarium eumartii tests

Seedling Quality Tests

All seedling selections were tested for texture and color. The seedlings were graded in dry-matter classes. Color was determined by the alcohol tests. The results appear in Michigan table 1.

Michigan table 1. Dry-matter and alcohol color rating of seedling selections.

Total seedlings	Year	Dry matter		Color 1/ with 8 reading
		Above 18.9%	Below 17.7%	
No.		No.	No.	No.
73	1951	27	3	14
439	1952	227	97	48

1/ Color reading is based on 8 (white) and 1 dark gray; other numbers between 8 and 1 show degrees of color.

Variety, Date-of-Planting, and Irrigation Trials

Eight varieties of potatoes planted on May 10, May 26, and June 16 at the Lake City Experiment Station were grown at 3 levels of irrigation: normal rainfall, normal rainfall supplemented to 2" per week, normal rainfall supplemented to 4" per week. The first week of August plaster of paris moisture blocks were placed adjacent to the rows of potatoes and readings taken on the Bouyoucos available moisture meter.

The earliest dates of planting produced the highest yield of potatoes of all varieties. Varietal differences were very pronounced (Michigan table 2). There was no response to the different levels of irrigation. However, the soil moisture readings showed adequate moisture throughout the long open fall and all potatoes grew to maturity.

Michigan table 2. Variety and dates of planting, U.S. No. 1 per acre

Date of planting	Variety								
	Pontiac	Kennebec	R136-3	Russet Rural	Katahdin	Irish Cobbler	Sebago	Chippewa	Mean
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
May 10	567	531	478	447	378	335	345	364	431
" 26	379	335	300	316	232	249	155	167	267
June 16	326	280	255	189	181	206	222	175	229
Mean	424	382	344	317	263	263	241	235	309

L.S.D. at 5% Varieties 42
Dates 66

New Introduction Under Test

Seedling No. R136-3, which has been tested in several locations in the State, is desired by the potato growers interested in the early potato market. High yield and scab resistance are responsible for the demand for this seedling. The initial work is under way to introduce it into the foundation seed program.

Michigan table 3. Uniform scab nursery.

Variety	Color	Replication 1				Replication 2			
		Seedling		Check		Seedling		Check	
		ar	ty	ar	ty	ar	ty	ar	ty
Cherokee	W	1	1	1	2	T	1	2	4
Menominee	W	1	2	1	2	1	1	1	3
Ontario	W	T	1	2	2	T	1	3	1
B 73-10	W	1	1	1	4	1	2	1	3
B 515-2	Rus	0	0	1	4	0	0	2	1
B 595-76	W	1	1	1	3	0	0	1	4
B 2162-18	R	T	1	T	3	T	2	1	3
B 2162-36	R	1	1	1	2	1	2	1	1
B 2162-49	R	T	1	1	4	1	1	1	2
B 2368-4	R	T	1	2	2	1	1	1	2
B 2368-6	R	1	1	1	3	1	1	1	4

Michigan table 3 continued

Variety	Color	Replication 1				Replication 2			
		Seedling		Check		Seedling		Check	
		ar	ty	ar	ty	ar	ty	ar	ty
B 2368-13	R	0	0	1	4	T	1	1	3
B 2920-20	R	T	1	1	4	O	0	1	4
B 2921-4	R	0	0	1	3	T	1	2	1
B 2921-10	W	1	3	1	4	1	2	2	2
B 2922-15	W	1	2	1	4	1	2	1	2
B 2922-26	W	1	3	1	4	1	1	1	3
B 2924-2	W	1	3	1	1	1	3	1	2
B 2935-7	W	T	1	T	1	1	1	1	1
B 2968-11	W	T	2	T	2	T	1	1	1
B 2968-56	W	1	2	1	1	T	1	T	2
B 2968-66	W	1	2	1	3	1	2	T	1
B 2969-12	W	1	3	1	1	1	1	1	2
B 3003-27	W	T	1	1	2	1	2	1	2
B 3003-36	W	T	2	1	2	T	1	1	4
B 3004-9	W	1	1	1	2	T	1	1	3
B 3006-22	W	1	1	1	4	T	1	1	3
B 3009-7	W	T	1	1	2	T	1	1	5
B 3009-9	W	T	1	1	5	1	1	1	3
B 3014-6	W	1	2	1	4	T	1	1	2
ND1255-1	Rus.	1	2	1	3	1	2	1	4
ND457-1	Rus.	2	2	1	3	1	3	1	1

MINNESOTA

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The activities and procedures in 1953 followed much the same pattern reported in 1952. More emphasis was given to hybrids of Solanum demissum clones resistant to the known races of late blight. The breeding material was screened for tolerance to late blight. Susceptible clones of the same approximate maturity varied in damage to foliage and stems from complete killing to a maximum estimated damage of 20 percent. The clones also varied in extent to tuber rot with some tolerant clones free of tuber rot. Clones that were immune to the four races used were in all cases free of tuber rot.

The four races of O(A), 1(D), 4(B), and 1,4(BD) have been isolated from Minnesota collections of late blight. Field tests with races A, B, D, and BD indicate that certain clones were resistant to the 4 races. Source of resistance was TI5, an old stock of Solanum demissum, and 2 recently obtained clones of S. demissum, which were known to be resistant to the known races of late blight. In addition to the hybrid clones from the above sources, Dr. Reddick's selection GOT-1 was also resistant in this test. Of isolates of infected plants in the field test, 80 percent were BD and 20 percent D.

Advanced Selections: The number of advanced selections that appear to be an improvement over existing commercial varieties materially increased the past year. In Minnesota table 1, the percentage of green foliage at time of harvest is given for these selections at East Grand Forks and at Crookston. At the other locations the harvest was either too early or too late to obtain a satisfactory comparison. In Minnesota table 2, the yield of these selections is given for five locations. The Red Pontiac has been convenient standard for comparative yield as it has given for many years at these locations a good yield. The overall rating, which is taken at harvesttime, covers market quality and yield. Selections Minnesota 355 and 358 are resistant to race A of the late-blight fungus and have some tolerance to races D, B, and BD. Selections 20 and 358 have a high content of dry matter. All are white selections for possible replacement of the Cobbler which ranks second in certified seed acreage in the United States, and of which over 50 percent is grown in Minnesota. The variety "Osseo" was introduced during the past year. It is an extra early variety, with a compact, distinctly upright growth habit, and produces tubers of marketable size under an exceptionally wide range of conditions.

Minn. table 1. Maturity of advanced selections at harvest.

Variety or selection	Parentage	Foliage green							
		East Grand Forks blocks				Crookston blocks			
		1	2	3	4	1	2	3	4
		%	%	%	%	%	%	%	%
Waseca		0	0	0	0	10	0	0	40
Minnesota 6-3	Minn. 6 x Minn. 42	10	5	10	-	10	0	5	0
" 12	Minn. 126 x (Hand x 56-1)	0	15	5	10	25	40	25	20
" 355	Minn. 6 x 96-56	5	15	10	5	5	20	15	30
" 20	Ac. from Reddick x Minn. 42	5	20	20	10	25	45	10	35
" 24	Chisago x Minn. 42	10	20	40	--	30	20	25	--
" 1	Osseo x Menominee	15	0	35	5	60	25	40	25
Chisago		10	25	15	35	40	30	40	40
Minnesota 358	Minn. 6 x 96-56	5	50	25	20	60	30	60	70
" 18	6364 x Minn. 43	40	50	30	60	70	80	55	60
Cherokee		45	25	40	40	80	90	65	70
Minnesota 11	Waseca x Menominee	30	60	70	60	70	90	60	40
Red Pontiac		30	60	60	55	80	80	60	60
Minnesota 119	Chisago x Minn. 42	35	50	50	--	70	60	70	--
Kennebec		80	80	95	95	90	100	90	95

Minn. table 2. Test of advanced selections in 1953.

Variety or selection	Mean yield per acre and location					Mean of 5 locations	Mean overall rating
	Castle Danger	Grand Forks	Crookston	Grand Rapids	Hollandale		
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	
Waseca	282	281	142	193	296	239	6.4
Minnesota 6-3	238	335	230	242	230	255	7.0
" 12	227	384	205	270	249	267	7.9
" 355	294	376	182	303	350	301	6.9
" 20	280	440	162	259	223	273	8.2
" 24	160	413	180	277	212	248	6.9
" 1	233	335	194	228	298	240	7.2
Chisago	214	419	236	275	266	275	6.6
Minnesota 358	313	458	160	398	258	337	7.7
" 18	280	371	170	348	212	286	6.8
Cherokee	211	414	210	328	232	279	5.7
Minnesota 11	240	404	254	506	478	340	7.7
Red Pontiac	254	398	295	234	226	282	7.2
Minnesota 119	234	425	178	466	260	313	7.4
Kennebec	195	414	259	326	440	287	7.4

1/ Mean of 2 blocks; at the other locations mean of 4 blocks.

MINNESOTA
Orrin C. Turnquist

In 1953 the Minnesota Extension Service conducted potato variety demonstration plots in the three commercially important producing areas in the State. Out of a total of 17 varieties 15 appeared at all 5 locations. The locations at Baker, Fisher, and Donaldson were on the heavy soils of the Red River Valley. The Hollandale location was on peat land in the southern part of the State and the Osseo plot was on the irrigated sand land area near the Twin Cities. Of each variety 100 pounds of seed was planted with standard equipment in double rows in commercial potato fields. All seed was selected from sources recommended by the Seed Certification Department of the State. Each plot averaged 400 feet in length but the yields were determined from a 2-rod row within each double row of each variety.

Minn. table 1 shows the total yield in bushels per acre and percentage of U.S. No. 1 size tubers. These data are the experience in the field at 5 locations for 1953 only. LaSoda averaged the highest in yield of all varieties tested. It had excellent market quality and good appearance at all locations. Osage was lowest in average yield and a considerable amount of hollow heart was observed at all locations with the exception of Fisher where only a small amount was noticed. In 1952 Redkote yielded 364 bushels per acre (see 1952 report) and was outranked only by Kennebec. In 1953 however, Redkote was one of the lowest in yield with 224 bushels per acre. No scab was observed on Redkote, Early Gem, Cherokee, Osage, and Minn. 113-1. As in 1953, Early Gem produced 25 to 30 percent abnormally shaped and growth-cracked tubers. Internal browning was observed in both Minn. 113-1 and N.D. 457 at all locations.

The dry matter of the varieties tested at the 5 locations is presented in Minn. table 2. Cherokee averaged the highest in dry matter and Early Gem lowest in the 1953 tests. For locations the highest average dry matter was at Fisher and lowest at Osseo. As in previous years the dry matter for all varieties was higher at the 3 Red River Valley locations than on the sand or peat land.

In addition to the above variety demonstration plots, observation plots were conducted at 3 other locations where scab is a problem. At the Princeton plot, 69 varieties and selections were grown on peat in 3-hill rows adjacent to Irish Cobbler. At Sabin^{and} Anoka 40 varieties and selections were grown on Fargo clay and peat, respectively. The adjoining row at Sabin was Irish Cobbler but at Anoka the variety Pontiac was used as a check row. The observations on scab and tuber type are present in Minn. table 3.

Minn. table 1. Performance of potato varieties tested in Minnesota in 1953.

Variety	Location and yield per acre										Ave. yield for location
	Hollandale		Osseo		Baker		Fisher		Donaldson		
	Total	No.1	Total	No.1	Total	No.1	Total	No.1	Total	No.1	
	yield	size	yield	size	yield	size	yield	Size	yield	size	
	Bu.	%	Bu.	%	Bu.	%	Bu.	%	Bu.	%	Bu.
LaSoda	321	97	354	95	432	97	461	97	160	89	346
P 45.3-6	398	94	347	87	364	90	334	92	145	79	318
Redburt	263	93	388	98	321	96	391	87	183	95	309
Red Pontiac	217	93	352	95	361	95	336	96	214	94	296
Kennebec	342	93	274	95	265	87	350	96	195	92	285
Early Gem	247	95	312	97	296	96	308	97	195	98	272
N.D. 457	201	93	257	93	366	90	303	97	209	95	267
Cherokee	224	90	281	92	320	91	300	94	187	90	262
Red Triumph	223	91	262	94	270	93	273	96	216	95	249
Irish Cobbler	228	93	197	85	313	90	304	95	185	93	245
Waseca	266	92	297	94	280	91	214	92	152	92	242
Minn.113-1	264	90	244	87	297	91	253	92	124	77	236
Osseo	221	95	295	96	255	98	196	97	160	95	225
Redkote	201	85	229	91	235	89	219	89	167	89	224
P 45.12-3	--	--	278	93	282	89	239	94	219	85	204
Osage	208	97	221	97	266	94	238	98	84	88	203
Satapa	--	--	--	--	342	--	--	--	--	--	342

Minn. table 2. Dry matter of potato varieties tested in 1953.

Variety	Location and dry matter					
	Hollandale	Osseo	Baker	Fisher	Donaldson	Ave. for locations
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Cherokee	20.0	18.9	21.4	23.1	21.2	20.9
Irish Cobbler	17.9	16.8	19.5	23.1	22.5	19.9
N.D. 457	20.8	16.2	18.7	22.1	21.2	19.8
Kennebec	20.2	18.7	19.3	20.0	20.6	19.7
Osage	19.5	18.3	19.1	21.0	18.9	19.3
Satapa	--	--	18.3	--	--	18.3
Osseo	16.0	16.6	17.4	20.6	20.6	18.2
Redburt	17.0	15.6	17.7	21.2	19.3	18.1
LaSoda	16.4	15.8	18.3	20.4	19.5	18.0
Red Triumph	15.3	15.3	17.7	21.0	19.8	17.8
Redkote	15.8	16.4	16.8	21.0	18.5	17.7
Waseca	15.1	15.6	17.2	20.8	20.0	17.7
Red Pontiac	16.0	16.2	17.2	20.4	18.3	17.6
P 45.3-6	14.9	15.3	17.7	21.0	18.7	17.5
Minn. 113-1	14.9	15.3	17.4	20.6	18.5	17.3
P 45.12-3	--	14.3	16.0	18.9	18.9	17.0
Early Gem	14.3	15.3	16.8	19.1	18.9	16.8
Ave. for varieties	16.9	16.3	18.0	20.9	19.7	

Minn. table 3. Uniform scab nurseries, Minnesota, 1953.

Scab Readings $\frac{1}{2}$

Variety	Princeton $\frac{1}{2}$ Seedling check		Sabin $\frac{2}{2}$ Seedling check		Anoka $\frac{3}{3}$ Seedling check		Ave. $\frac{4}{4}$ type of tubers	Color
Cherokee			0-0	1-2	1-2	4-5	1	W
Menominee			2-3	1-2	1-1	5-4	1	W
Ontario			0-0	2-2	2-2	4-4	3	W
B 73-10			0-0	2-2	1-2	4-4	1	W
Early Gem			0-0	2-4	0-0	4-5	1	Rus
B 595-76			0-0	2-3	2-2	4-5	3	W
B 2162-18			3-3	3-3	2-2	5-4	3	R
B 2162-36			0-0	3-3	T-1	5-5	1	R
B 2162-49			2-1	2-2	0-0	5-4	1	R
B 2368-4			1-1	2-2	2-3	4-4	3	R
B 2368-6			1-1	2-3	3-2	5-4	3	R
B 2368-13			2-2	3-2	4-3	4-4	3	R
B 2874-4			0-0	3-2	2-1	4-4	2	R
B 2879-4			1-1	3-2	2-1	4-4	1	R
B 2920-13			T-1	2-2	2-2	4-4	2	W
B 2920			-	-	5-2	4-4	3	W
B 2921-4	1-1	2-3	1-1	2-2	3-1	4-4	3	W
B 2921-10	2-3	2-3	2-1	3-3	3-2	4-4	1	W
B 2922-15	3-4	2-3	--	-	3-2	4-4	3	W
B 2922-26	3-3	2-3	2-1	3-3	3-3	4-4	3	W
B 2924-2	2-3	1-2	3-2	2-2	3-2	5-5	2	W
B 2935-7	2-1	3-4	3-3	2-2	2-2	3-4	3	W
B 2968-11	2-4	3-4	2-2	3-3	2-3	3-3	1	W
B 2968-56	2-3	2-5	-	-	0-0	3-4	2	W
B 2968-66	3-3	2-4	0-0	2-2	3-3	4-4	2	W
B 2969-12	0-0	2-5	1-2	2-2	2-2	5-5	2	W
B 3003-27	T-1	1-3	4-3	3-3	1-1	5-4	1	W
B 3003-36	2-1	2-4	0-0	2-2	3-1	4-4	5	W
B 3004-9	2-3	1-3	3-2	3-2	4-3	4-4	5	W
B 3006-22	T-1	2-3	2-2	2-2	1-1	4-4	3	W
B 3009-7	0-0	T-1	1-1	2-2	1-1	4-4	3	W
B 3009-9	1-1	T-1	2-1	2-2	2-1	5-4	3	W
B 3014-6	1-1	2-3	1-2	2-2	2-3	4-4	3	W
ND 1255-1	1-1	2-3	-	-	2-2	4-4	1	Rus
ND 457-1	2-3	3-1	-	-	4-3	4-5	1	W
Minn 113-1	1-1	1-1	1-1	2-2	T-1	4-4	1	W
Osage	1-1	2-1	0-0	2-2	T-1	4-4	3	W
Redkote	0-0	2-3	3-2	2-2	1-1	3-3	1	R
Redburt	T-3	2-1	3-3	2-3	4-5	4-4	3	
Rus. Burbank	0-0	2-4	0-0	1-2	0-0	5-5	3	Rus
Starks Red	1-5	3-3						R
Liberty Russet	0-0	1-3						Rus
Keswick	1-3	1-3						W

Minn. table 3-continued.

Variety	Princeton <u>1/</u> Seedling check	Sabin <u>2/</u> Seedling check	Anoka <u>3/</u> Seedling check	Ave. <u>4/</u> type of tubers	Color
Anoka	1-3	1-1			W
Minn. 47.48-1	1-3	T-1			W
Minn. 47.48-2	1-3	3-1			W
Minn 11	3-1	2-3			W
Minn. 355	2-4	2-1			W
Minn 18	1-1	T-1			W
I 933-2	1-2	1-3			
I 8119-2	2-2	1-3			
I 961-1	3-3	2-1			
I 811-1	3-1	2-3			
I 874-2	4-1	2-1			R
I 8140-1	2-3	1-3			
I 8168-26	3-1	1-1			
I 44-16-1	T-3	2-3			
I 1087-1	2-3	2-4			
I 872-4	T-1	1-3			
I 947-13	0-0	1-2			
I 8119-4	1-2	3-4			
B 2329-11	3-1	2-3			R
B 2368-10	3-1	1-2			R
B 962-9	2-2	1-2			
B 606-37	1-5	2-1			
B 922-6	3-3	T-1			
B 2368-4	2-2	2-4			R
B 920-7	1-1	2-1			
B 2893-11	2-1	T-1			W

1/ Scab readings given as Area and Type in that order.

2/ Irish Cobbler, check

3/ Pontiac, check

4/ Type of tuber rated as follows: 1 = Very good: 2 = Good:
3 = Fair 4 = Poor
5 = Very poor

Anoka and Princeton are Peatland.

MISSISSIPPI
W. S. Anderson

A very poor stand of seedlings was obtained in the plot at Newton on account of unfavorable growing conditions. Accurate observation notes could not be taken. A plot planted in a different section of the State was hit by the prolonged 100° temperature in May and tuberization stopped.

MONTANA (Bozeman)

H. N. Metcalf

Potato Variety Trial, 1953

In 1953, 8 varieties of potato were planted in trial at Bozeman, the primary purpose of which was to compare the varieties for scab resistance and to maintain stock for planting at various branch stations.

Single rows of each variety and two rows of Early Gem were planted on May 14. The rows were approximately 210 feet long. The trial was planted on Huffine silt loam that had grown potatoes in 1952, and there was considerable difficulty with volunteers from tubers that had overwintered in the soil. The stand was very erratic, and the computation of acre yields from the crop obtained is viewed as unwarranted. The tubers obtained from the trial at digging on September 17 were held in storage until December 16, at which time they were graded. The data for this test are given in Mont. table 1.

Mont. table 1. Potato variety trials at Bozeman, Mont.

Variety	Total yield	No. 1 yield	No. 1 grade
	Lb.	Lb.	Lb.
P45.114-6	53.5	38.0	71.0
Redkote (P45.11-101)	144.5	137.0	94.8
Cherokee	96.0	70.0	72.9
Cayuga	91.5	56.5	61.7
Columbia Russet	61.0	49.5	81.1
White Cloud	162.0	136.5	84.2
Early Gem	161.0	150.0	93.2
Canso	143.5	130.5	90.0

Of these data, perhaps the percentage No. 1 grade is the only really significant figure. Redkote, Early Gem, and Canso had the highest percentage of No. 1 grade tubers.

At the time the grading was done notes on each variety were as follows:

P45.114-6. Fairly smooth tubers with shallow eyes and slightly russet skin. No scab evident, but a few tubers were showing apical sprouts.

Redkote. Fairly smooth tubers with eyes of moderate depth. Apparently rather late in maturity as the tubers were considerably skinned. No scab evident, but there were some rotten tubers. Skin red.

Cherokee. Rather irregularly shaped tubers with smooth white skin, frequently tinged pinkish. Condition rather soft, with some scab evident. A few tubers were showing apical sprouts.

Cayuga. Quite rough-shaped rather immature tubers with russet skin. Not nearly as attractive as Early Gem, and should probably be abandoned in favor of that variety. No scab evident.

Columbia Russet. Rather rough-shaped immature tubers with some russeted skin. Tubers shaped like Netted Gem. Not as attractive in appearance as Early Gem.

Early Gem. Smooth, shallow-eyed, mature tubers of good size, with well-russeted skin. No scab evident. Looks promising.

White Cloud. A smooth, round, white tuber, but quite scabby with a number of rotten tubers. A few tubers were showing apical sprouts. Probably of limited value in Montana due to lack of russet skin and scab susceptibility.

Canso. Smooth round tubers with slightly russet skin, and a very slight incidence of scab, with a few rotten tubers.

Of these varieties, probably Redkote, Early Gem and Canso are most worthy of being continued in trial, and Early Gem apparently is the most promising of the three varieties.

MONTANA (Creston)
C. W. Roath

Potato Variety Trials, 1953

In 1953, 6 varieties of potatoes were planted at Creston. The trial was planted on May 16, employing 4 replications. The plots were single rows 30 feet long and $3\frac{1}{2}$ feet apart, giving a plot size of 0.00241 acre. The trial was grown under irrigation on Creston silt loam. The plots were dug on September 29. The data obtained are presented in Mont. table 2.

Mont. table 2. Yield in pounds per plot, potato variety trials, Northwestern Montana Branch Station, Creston, 1953.

Variety	Replications				Totals	Yield per acre
	1	2	3	4		
Netted Gem	49	60	66	59	234	Cwt. 243
Early Gem	37	59	66	34	196	203
P 45.11-101	57	63	68	49	237	246
P 45.14-6	44	62	57	35	198	205
Canso	34	59	64	61	218	226
Columbia Russet	54	74	88	71	287	298
Totals	275	377	409	309	1370	237
L.S.D.					5% 44	1% 61

Columbia Russet was the only variety producing a yield significantly greater than Early Gem, the lowest-yielding variety in the trial, or than the general average for the trial. However, this variety was so scabby as to probably preclude its becoming a commercial variety in the Flathead area. Canso was also very scabby, whereas Netted Gem and Early Gem were free from scab, the tubers of the latter two varieties also being quite well mature at harvest.

P45.11-101 was very lightly affected by scab, the tubers were mature and of good type, but had a high percentage of hollow heart.

P45.14-6 was also very lightly affected by scab, and the tubers were also mature and of good type, but some cracked tubers were noted.

Canso and Columbia Russet are too susceptible to scab to be continued in the trial, while the high percentage of hollow heart in P 45.11-101 tends to lessen its potential value. Netted Gem, the commercial variety in the Flathead district, Early Gem, and P 45.14-6 will probably be included in the 1954 trial.

Yield Comparison of Two Early, Scab-resistant Potato Varieties, 1953

In order to compare the yielding ability of 2 early to second-early potato varieties, Early Gem and Cayuga, that had been shown to be scab-resistant in previous trials, an experiment was set up in 1953 to permit serial harvests from a randomized block design. The trial was planted on May 16, employing 4 replications of single-row plots, the rows being 30 feet long and $3\frac{1}{2}$ feet apart, giving a total plot size of 0.00241 acre. Eight hills of each variety in each replication representing the yield from 35 square feet or 0.000803 acre, were dug on August 10, August 19, and August 29. Data were recorded only for tubers weighing 4 ounces or over. The data obtained are presented in Mont. table 3.

Mont. table 3. Yield in ounces per plot and pounds per acre from yield comparison of Early Gem and Cayuga potato varieties, Creston, Mont., 1953.

Harvest date	Variety	Replications				Variety x date totals	Harvest date totals	Yield per acre
		1	2	3	4			
								Lb.
August 10	Early Gem	48	88	52	48	236		4,589
" 10	Cayuga	8	8	20	12	48	284	933
" 19	Early Gem	128	120	128	72	448		8,712
" 19	Cayuga	28	36	48	20	132	580	2,489
" 29	Early Gem	152	180	172	120	624		12,135
" 29	Cayuga	108	120	136	104	468	1092	9,101
Variety x Block	Early Gem	328	388	352	240	1308		8,479 (mean)
Totals	Cayuga	144	164	204	136	648		4,174 "
Block totals		472	552	556	376		1956	

As is to be expected, the yields of both varieties increased as the season advanced, with Early Gem being a consistently higher-yielding variety than Cayuga. However, the ratio of increase in yield for Cayuga from the first to the third harvest was greater than that for Early Gem.

While both Early Gem and Cayuga have been scab-resistant under the conditions prevailing at Creston, it would appear that Early Gem is the preferable variety on account of higher yielding ability.

Scab-resistant Potato Variety Trials, 1953

Stock of 11 reportedly scab-resistant potato varieties and species of foreign origin were obtained from the Inter-regional Potato Introduction Station at Sturgeon Bay, Wis., and grown under the severe scabbing conditions prevailing at the Northwestern Montana Branch Station at Creston.

From 3 to 6 hills of each of the lots were planted on Creston silt loam on May 16. The trial was grown under irrigation and the plots were harvested on September 26. At harvest it was found that 5 of the lots had failed to tuberize under the prevailing photoperiod. These lots were: Solanum chacoense (PI 175401), S. chacoense (PI 175443), S. chacoense (PI 197738), Arnica (Ac. No. 2859), and an unnumbered lot of S. commersonii. The data obtained from the remaining lots are presented in Mont. table 4.

Mont. table 4. Trial of allegedly scab-resistant potato varieties and species of foreign origin at Northwestern Montana Branch Station, Creston, Montana, 1953.

Variety or species	Vine character	Tuber character	Hills	Yield	Scab notes
			No.	Lb.	
Panther (PI 182556)	Large	Late, long white	5	15	Quite scabby
Yesselster (Ac. No. 2906)	Small	Mature, red	4	4	No scab
Carnea (PI 188751)	V. large	Mature, round, red	6	19	" "
Ackersegen (PI 182550)	" "	Late, round to flat, white	6	21	" "
Hindenburg (Ac. No. 2860)	" "	Mature, variable shape, white	4	13	" "
<u>Solanum commersonii</u> (PI 197760)	Large	Late	6	0.5	Scabby

These data show that Panther and Solanum commersonii (PI 197760) were susceptible to scab under Creston conditions, while Yesselster, Carnea, Ackersegen, and Hindenburg were free from scab. The performance and character of some of these scab-resistant varieties were such as to arouse considerable interest in further trial of them in 1954.

MONTANA (Moccasin)

J. L. Krall

Potato Variety Trial, 1953

Five lots of potatoes were planted in a variety trial at Moccasin in 1953 from stock supplied from the main station at Bozeman. Three replications of 0.0039 acre were planted on May 18 for each variety. Plots were single rows 48 feet long, $3\frac{1}{2}$ feet apart.

Stands of plants obtained were very poor and, except for Early Gem, harvest records were taken from only 2 of the 3 replications. The data obtained are presented in Mont. table 5.

Mont. table 5. Mean yield in pounds per plot, potato variety trial, Central Montana Branch Station, Moccasin, Montana, 1953.

Variety	Maturity	Yield per plot 2/			
		No. 1	No. 2	Total	No. 1
		Lb.	Lb.	Lb.	Pct.
Bliss Triumph	Early	4.7	6.7	11.4	41
Early Gem ^{1/}	Early	4.3	1.4	5.7	75
Cherokee	Mid-season	2.9	5.3	8.2	36
Pl45.14-6	Mid-season	4.7	6.7	11.4	41
Redkote	Late	4.6	5.6	10.2	45

^{1/} Mean of 3 replications (3 repls.planted, but only 2 harvested for others.)

^{2/} Stand was poor.

Percentage of No. 1 tubers was very low in this trial, with only Early Gem approaching a normal percentage. Although the total yield of Early Gem was the lowest in the trial, its yield of No. 1 tubers was nearly as high as that of Bliss Triumph, Pl45.14-6, and Redkote, which produced nearly twice as great total yields. If means can be found to improve the total yield of Early Gem at Moccasin, it might prove to be a desirable potato there. Redkote is probably too late in maturity for Moccasin conditions. No specific gravity data were obtained from this trial. Potato variety trials will be continued at Moccasin in 1954.

NEBRASKA

H. O. Werner, J. A. Riddell, Lionel Harris, and Robert O'Keefe

1. PROJECT: Bankhead-Jones 229. The development of new varieties with superior disease resistance, yield, and quality.
2. Departments and Cooperating Agencies: Horticulture, Scotts Bluff and Box Butte Field Stations and Hort. Crops Res. Branch, U.S.D.A.
3. Personnel: H. O. Werner, J. A. Riddell (since June 15, 1953), Lionel Harris, and Robert O'Keefe.
4. Nature of Research and Principal Results of the Year:
 - a. The customary comprehensive program, i.e., true seed production, testing, and finally variety introduction, was carried on. The most significant aspects and results to date are:
 - 1'. Recent crosses have yielded a number of segregates in which a high degree of scab resistance has been combined with other desirable tuber characteristics such as red skin color, good market type, good interior color, and high specific gravity (indicative of high cooking quality) and also with desired season of production and good yield. Several hundred such superior clones are being screened as rapidly as possible to more definitely determine their characteristics and adaptability to Nebraska conditions. Some will be suitable commercially, but others will provide excellent stocks for further breeding efforts.
 - 2'. Approximately 100 advance clonal lines are being increased for field testing, cooking tests, etc. Among these are:
 - (a') Two varieties introduced in 1953. They were Dazoc (213.43-3) early bright dark-red tubers of superior market and culinary qualities. Because of the great superiority of this variety to the Red Warba now being grown, growers will be planting several hundred acres in central Nebraska in 1954. Sheridan (213.43-2) midseason to early round red variety most suitable for western Nebraska where it may replace Triumph acreage.

Both of these varieties are superior in culinary qualities - including deep fat frying to the other red varieties now grown in western Nebraska (Triumph, Progress, LaSoda and Red Pontiac).

- (b') Red tuber line, 209.43-1, because of interest among growers, may be released for general commercial use in 1954. It may replace some of the acreage now planted to Pontiac -- a variety of low market and culinary qualities.
- (c') Line 26.44-1, a high-producing red line of superior culinary quality and market desirability, will probably be increased to commercial quantities in 1954 for release in 1955. As the tubers have very high specific gravity, they are excellent for baking and deep fat frying.
- (d') Four lines that will be increased as rapidly as possible with a view to possible naming and release in 1956 are:
- 189.45-6 - red tubers of the general characterization of Triumph but much more versatile adaptability and superior because of freedom from harvest cracking and dependably greater productivity.
- 91.47-1 - medium to light red, very good type tubers of high scab resistance, good cooking quality and highly productive.
- 154.47-1 - dark-red tubers, very good tuber type, high yield, good specific gravity, intermediate scab resistance.
- 223.48-1X - round, light russet white tubers of excellent appearance due to good type, general smoothness, and uniformity, very good culinary quality of tubers and high yields in all parts of the State. This is probably the most promising white tuber selection we have as yet developed in Nebraska. For yield and grade notes of these varieties, see tables which follow.

b' Clone and Variety Testing:

- 1' Testing for scab resistance was the major objective in five plats planted on land where serious scab infection could be expected. Two of these plats were at the Scotts Bluff Experiment Station, two at the Box Butte Experiment Farm, and one on a private farm on the Dutch Flats in southern Sioux County. The first four plats were fairly satisfactory, but in none of the plots was there uniform or severe infection of susceptible lots, so there still are uncertainties concerning scab resistance of many of our advance lines. The Dutch Flats plot was abandoned because of the almost complete absence of

scab where scab in earlier years was very prevalent. These four plats provided opportunity to get much data of value in determining the adaptability of the lines to dry land or irrigation conditions.

- 2'. Out-State testing in Nebraska: (by Robert O'Keefe)
Approximately 8 advance selections and 3 standard varieties were grown in replicated rows and 9 advanced lines and 8 varieties were grown in single observational lines in 15 plats located as follows:
- 1 - Eastern Nebraska dryland
 - 2 - Central Nebraska dryland
 - 2 - Central Nebraska irrigated
 - 3 - Western Nebraska dryland
 - 7 - Western Nebraska irrigated

Yields and grade quality are determined for all lots at all trial places and specific gravity and tuber size classifications for most lots and places.

The results from these plats quite largely determine which lines are increased most extensively and which are eventually introduced.

Summaries of these trials follow this narrative.

- 3'. Central States Regional Uniform Yield Tests:
Replicated irrigation yield tests were conducted both in central and western Nebraska with 23 varieties or advance lines of potatoes submitted for trial by the potato breeders in North Dakota, Minnesota, Wisconsin, Michigan, Nebraska, Iowa, and Kansas. This permits wider evaluation of our advance lines and also permits us to become acquainted with the better lines from the other States before they are released.

4'. Controlled Tests:

- a'. Culinary quality was evaluated by determining specific gravity of tubers of all clones as grown in at least one location and by potato chip tests of selected advance lines.
- b'. Wound healing rate and ability of tubers of various lines were studied by determining the rate of water loss from sets of cylinders cut from tubers of the various lines, as these were held under uniform conditions favorable for wound healing.
- c'. In cooperation with Dr. W. J. Hooker of the Iowa State College, the segregates of several families were tested for late blight susceptibility or resistance.

c. Technical Studies: (by John A. Riddell)

The leaf turgidity studies initiated in 1950 and 1951 were resumed in 1953. The object of this work is to ascertain the differences in relative turgidity of leaves of different varieties under high and low soil moisture conditions. This has been instigated on the hypothesis that high leaf turgidity is associated with high photosynthetic efficiency and drought endurance. Before advancing to variety studies, it has been found necessary to ascertain the general daily rhythm of turgidity and dry-matter changes in leaves of one variety throughout several days and at various plant ages. Our 1953 studies show that with the most favorable soil moisture conditions, leaves rarely attain 100% relative turgidity, that the maximum R.T. values are generally attained shortly after midnight, and that after 6 a.m. they decrease rapidly to the minimum at about 2:30 p.m., after which the increase is rapid till sundown then slower till the midnight maximum. The R.T. is influenced greatly by the vapor deficit as determined by water losses from spherical black atmometers during the previous hour, half day, or even perhaps the previous 24 hours. The level of R.T. percentages is influenced more by daily vapor density than by soil moisture until it is no longer readily available in the surface part of soil. Then the soil moisture deficiency exerts a great influence in lowering R.T. values, including both the maxima and minima.

R.T. values were determined twice daily during 4 weeks with a group of varieties, but as yet the basic aspects have not been clarified sufficiently to permit proper analysis of these data. The data on the dry-matter content per unit area at various times and under various conditions are available for extensive supplementary studies.

5. Application of Findings:

The 1953 introductions, Dazoc and Sheridan, are being enthusiastically received by commercial interests. Central Nebraska growers are very dissatisfied with the poor market quality of the Red Warba tubers they have been able to grow most years. The yield of U.S. #1 grade potatoes of Dazoc and Sheridan in a few pilot plantings was not quite as high as of Red Warba, but their appearance and market quality were so much better in 1953 than those of Red Warba that the potatoes of the new varieties netted much greater financial returns. Because of this, all available seed of Dazoc has been bought for planting in the central Nebraska commercial area. The variety Sheridan may be utilized most extensively in western Nebraska for the production of round red potatoes of superior market appearance and quality.

The line 209.43-1 is considered a desirable replacement for the Red Pontiac which is not desirable for building an industry. The western Nebraska industry is now seriously hampered by the lack of good varieties. It is thought that the introductions rather definitely planned for the next 3 years will aid greatly in establishing the industry on a better basis.

The lack of adequate facilities for comprehensive culinary tests of even the advance lines is a very serious handicap.

6. Work Planned for Next Year.

Continuation of various testing phases including new work in isolating lines resistant or immune to virus X and increase of stocks of advance lines as listed in previous section. Probably investigating morphological characteristics of leaves of different potato varieties and determining their possible association with drought or heat endurance or efficiency in tuberization.

The discovery of bacterial ring rot infection among some of the stocks at the Box Butte Farm will necessitate considerably more vigilance to prevent its spread and to exterminate it. This will either require more funds or a curtailment of the increase program.

7. Publications.

"Potato Variety Trials in Eastern and Central Nebraska 1941 to 1951" by H. O. Werner, Horticulture Progress Report #19, submitted July, 1953.

"Potato Variety Trials in Northwestern Nebraska for the Years 1948 through 1951". Robert O'Keefe and H. O. Werner. Horticulture Progress Report #20. Submitted August, 1952. Issued about March, 1953.

"Potato Variety Trials in Eastern and Central Nebraska, 1948 to 1951, Inclusive," H. O. Werner and Robert O'Keefe, Horticulture Progress Report #21, submitted for publication, January 1954.

"1952 Nebraska Potato Variety Trials" by H. O. Werner & Robert O'Keefe, Horticulture Progress Report #22, submitted October, 1953.

"Influence of Atmospheric and Soil Moisture Conditions on Diurnal Variations in Relative Turgidity of Potato Leaves", by H. O. Werner, submitted as a Nebraska Agricultural Experiment Station research bulletin manuscript July, 1953.

Neb. table 1. Western Nebraska Irrigated Trials in 1953. Means of 7 irrigated trials. Four 25-hill randomized rows with each variety except where indicated by * when only 1 row of 25 hills was planted.

Variety or breeding line	Tuber color	Tuber type	Total yield per A	Dry matter	U.S. No. 1	Each grade of total			Tubers each			
						A size tubers-over 1-		7/8" defective tubers	size were of			
						A size No.1						
						Scab		Rough	1 7/8-2 5/8"			
						Total	Mild					
						Bu.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Named Red Varieties												
Triumph	R5.0	8.3	256	18.9	40.8	29.1	6.8	8.8	60.6			
Progress	R7.1	9.0	312	19.2	54.5	23.6+	17.8	9.6	59.5			
Sheridan	R7.4	10.0	403	19.7	57.1	25.1	11.3	2.8	35.5			
Dazoc	R9.7	8.6	299	19.2	46.4	36.8	15.4	6.2	53.0			
Red Pontiac	R7.6	8.1	390	17.2	52.9	25.5	11.5	10.0	24.2 ^{2/}			
La Soda	R3.7	8.1	436	17.9	52.7	31.6	16.6	5.2	24.0 ^{2/}			
Advanced Red Selections												
209.43-1	R9.1	9.0	314	19.2	52.2	32.2	4.3	3.0	50.9			
26.44-1	R6.9	9.7	356	20.9	56.8	31.6	18.2	1.7	51.2			
189.45-6	R6.0	8.6	398	19.2	52.0	27.0	13.9	4.5	53.6			
91.47-1	R5.6	9.3	400	18.9	67.9	20.0	19.1	3.5	46.7			
154.47-2	R8.3	9.6	267	20.1	76.2	8.1	7.3	5.3	33.5			
White Varieties or Selections												
*223.48-1x	Rus	10.0	433	20.4	76.9	5.8	6.4	4.5	35.1			
118.47-1	W	10.0	393	20.2	58.2	20.8	11.9	3.9	55.4			
*Katahdin	W	9.7	292	20.4	57.2	22.0	16.0	2.3	19.5 ^{2/}			
*Early Gem	Rus	8.1	211	17.4	50.5	1.0	1.0	40.8	12.2 ^{2/}			

/ Numbers inserted indicate numbers of plats from which data were procured and averaged whenever less than 7. With 154.47-2 there were only 3 plats.

+ Many Progress tubers had a number of short shallow growth cracks which corked over looking somewhat like scab. They constitute a surface blemish but should probably not be classified as "scab". Hence, this mean for scab is undoubtedly too high. Tubers with distinct scab lesions or pits constituted less than 5% of the total. Very little or none of this type of growth cracking occurred with any other varieties.

* 1 row of 25 hills was planted.

Neb. table 2. Western Nebraska Dryland Trials in 1953. Mean of 2 trials on the Box Butte Experiment Farm near Alliance. (2 planting dates - June 15 and 30). Four 25-hill single-row randomized plats of each variety except where indicated with an *, when only one 25-hill row was used.

Variety or breeding line	Tuber color	Tuber type	Total yield per A	Dry matter	Each grade of total A size tubers over 1 7/8"				Tubers each size were of A size No. 1 1 7/8-2 5/8"	Gen. rating as potato chips
					U.S. No.1	Defective tubers				
						Total	Mild	Rough		
Named Red Varieties										
Triumph	R4.5	9.0	108	18.5	50.5	6.8	6.8	5.7	65.9	7
Progress	R7.0	9.0	140	19.0	36.7	23.9+	20.7	8.3	80.6	6
Sheridan	R7.5	10.0	161	20.7	48.6	9.0	8.2	2.8	63.2	9
Dazoc	R9.0	8.0	132	19.5	34.4	30.7	23.5	2.6	62.5	9
Red Pontiac	R6.5	8.5	170	18.0	64.0	7.3	6.7	7.8	31.0	6
La Soda	R4.5	8.5	232	20.3	46.0	38.6	30.6	4.0	43.2	7
*Red Warba	R8	8.0	227	19.6	4.9	66.3	46.8	13.3	45.0	8
Advance Red Selections										
209.43-1	R9.0	9.5	109	18.7	54.1	10.5	9.4	2.5	53.6	9
26.44-1	R6.5	10.0	186	21.0	74.8	8.4	7.5	5.1	46.3	10
189.45-6	R5.5	10.0	187	20.2	53.3	2.2	2.2	5.6	68.9	9
127.46-1	R5.5	10.0	112	20.3	54.3	14.2	13.4	2.1	68.7	8
91.47-1	R5.5	9.0	188	19.4	66.8	3.8	3.5	5.3	59.7	9
154.47-2	R7.0	10.0	128	20.5	55.1	17.2	15.8	5.9	66.7	8
89.46-2	R7.0	9.0	121	20.1	48.8	2.2	2.2	14.6	65.8	5
White Varieties or Selections										
White Cloud W		10.0	130	20.5	28.9	44.5	35.6	0	77.0	9
*I. Cobbler W		8.0	101	21.0	34.8	33.2	27.2	14.5	44.4	-
Early Gem Rus		8.0	101	21.9	56.8	0	0	17.9	68.7	-
*Katahdin W		10.0	135	20.7	57.6	31.3	31.3	0.7	46.5	-
118.47-1 W		10.0	174	19.9	52.0	6.2	6.1	14.2	66.3	9
*223.48-1x Rus.		9.0	193	20.7	50.0	21.3	21.3	10.6	30.2	9

+ Many Progress tubers had a number of short shallow growth cracks which corked over looking somewhat like scab. They constitute a surface blemish but should probably not be classified as scab. Hence, this mean for scab is undoubtedly too high. Tubers with distinct scab lesions or pits constitute less than 5% of the total. Very little or none of this type of growth cracking occurred with any other varieties.

* One 25-hill row was used.

Neb. table 3. Central Nebraska early irrigated trial. One near Cozad in Dawson County, April to August, 1953. Four 25-hill single-row randomized plats except where indicated by * when a single 25-hill row was used.

Variety or breeding line	Tuber color	Tuber type	Total yield per A	Dry matter	Each grade percent of total			A size #1 grade 1 7/8 to 2 5/8"
					A size-over 1 7/8"			
					U.S. No. 1	Defective tubers		
					Total scab	Rough		
			Bu.	Pct.	Pct.	Pct.	Pct.	Pct.

Named Red Varieties								
Triumph	R3	8-	547	14.3	66.3	4.6	26.0	45.6
*Dazoc	R7	8	408	16.0	75.3	13.2	4.7	49.1
Red Warba	R8	6	649	14.4	46.5	12.2	35.1	75.6
Red Pontiac	R3	8	391	15.4	69.6	10.2	14.6	43.7
LaSoda	R2	9	441	14.3	68.1	4.3	20.1	35.4

Advance Red Selections								
209.43-1	R8	8	384	14.9	69.0	5.7	11.1	69.2
26.44-1	R6	9	212	16.4	73.7	2.8	3.5	63.2
127.46-1	R3	9	362	16.0	82.3	7.0	3.5	47.8
91.47-1	R3	9	417	17.4	71.9	2.3	8.0	72.9
154.47-2	R7	9	438	17.7	66.7	6.8	13.4	48.4
189.45-6	R4	9	453	16.0	65.8	6.7	0	29.1

White Varieties or Selections								
*White Cloud	W	9	699	17.7	85.0	8.2	2.7	38.7
*I. Cobbler	W	6	353	18.2	54.3	9.6	32.7	24.5
Early Gem	Rus.	7	316	13.9	30.8	0	63.5	80.8
118.47-1	W	10-	463	15.5	83.7	1.2	5.6	46.2
*223.48-1X	Rus.	9	910	17.4	83.9	0	8.5	33.2
*Katahdin	W		363	14.9	91.2	3.4	3.4	31.7

* One 25-hill row was used.

NEW HAMPSHIRE

Paul T. Blood

1953 potato variety test. Young Field, Dover, N. H.

Variety or seedling	Yield per acre		Variety or seedling	Starch
	No. 1	No. 2		
	Bu.	Bu.		Pct.
Kennebec	275	53	Fl4519	17.1
Green Mountain	272	44	B 932-9	17.0
Teton	270	47	Cherokee	15.3
B 621-16	231	24	Green Mountain	15.0
B 355-44	225	30	B 355-44	15.0
B 606-67	200	78	Fl451	14.7
Yampa	195	35	Cobbler	14.6
Russet	181	91	Canso	14.5
Keswick	172	46	Yampa	14.4
Fl419	167	48	B 606-67	14.3
Ontario	165	36	Teton	14.3
Cherokee	156	57	Kennebec	14.2
Houma	153	76	Keswick	14.1
Russet Sebago	152	62	B 621-16	14.1
Chippewa	149	76	Ontario	13.9
Canso	146	54	Russet	13.9
B 932-9	144	94	B 73-10	13.2
Katahdin	142	56	Katahdin	13.0
B 73-10	130	31	Chippewa	12.8
Pawnee	126	34	Houma	12.7
Cobbler	114	72	Russet Sebago	12.6
Fl4519	111	82	B 961-20	12.6
B 961-20	105	40	B 447-98	12.5
B 447-98	86	51	Pawnee	12.2

Planted May 12, 1953 - 1500 lbs. 8-12-12-2 fertilizer. Rows 3 feet apart, 10 inches in row. Two 20-foot plots per replication, replicated 4 times. Very dry summer, 0.39" rain in June, 3.08" below normal; 1.18" in July, 1.18" below normal; 4.26" below normal for June and July.

Chipping Tests for 1953 Variety Plots

Samples held at 40° F. removed from storage and kept at 70°-80° for 2 weeks before chipping. Cottonseed oil frying medium; starting temperature 375°F.

Color Rating

Excellent

Kennebec
Fl4519 } very
Fl451 } light
B 932-9 }

B 355-44 }
Russet } light
B 621-16 }
Cherokee }

Good

Canso
Katahdin
Houma
Yampa

Fair

Chippewa
Ontario
B 73-10
Keswick
B 606-67

Poor (dark)

Teton
R. Sebago
Cobbler
B 961-20
Gr. Mountain
Pawnee
B 447-98

NEW JERSEY
J. C. Campbell

Variety Trials

Three variety tests were conducted in New Jersey in 1953. The growing season was very hot and dry, and yields were lower than average where irrigation was not used.

In the test in Middlesex County on the Spencer Perrine farm at Cranbury, the varieties were planted in 2-row plots, 85 feet long, and were replicated 3 times, with the exception of the U.S.D.A. seedlings and varieties, which were not replicated. The soil is a Sassafras loam with a pH range of 4.7 to 5.2. The potatoes in this test were planted on April 22 and were harvested on September 25, after most all plants were mature.

The growing season was one of the driest and warmest on record. The rainfall at the Perrine farm amounted to 8.4 inches between June 1 and October 1, only slightly more than $\frac{1}{2}$ inch per week or less than half the amount required.

The yields and dry-matter data are presented in N.J. table 1. The yields were determined from 1/120th acre plots and the dry-matter percentages were determined from 15 medium-sized tubers by floating them in various salt solutions.

Highest yields of U.S. No. 1 potatoes were produced by New Jersey Chippewa and Maine Katahdin, followed closely by a Maine source of Keswick and Pungo.

A new red seedling, No. 1301, from Starks Farms, Wis., produced a very large percentage of B-size potatoes, as did the Cherokee variety. The Wisconsin source of Chippewa failed to make top yields for the first time in several years. This strain also fell off in percentage of U.S. No. 1 because of its susceptibility to scab. This trait was also observed in several commercial plantings.

Of the U.S.D.A. seedlings and varieties tested, seedling B 606-67 produced the highest total and U.S. No. 1 yields despite the fact that it also produced 9% knobby tubers. Other high-yielding seedlings were Nos. B 355-35, B 922-6, and B 926-9. The last-mentioned seedling produced numerous slightly spongy, and severely sprouted tubers under the hot growing conditions that prevailed. The Canso and Keswick varieties furnished by the U.S.D.A. also produced relatively good yields.

The varieties with the highest dry-matter content were Pungo, Green Mountain, Cherokee, and Cobbler, all of which averaged over 18 percent under very adverse growing conditions.

In the test in Monmouth County on the Oscar Ketcham farm, the varieties were planted on April 26 in duplicate plots 2 rows wide and 300 feet long. They

N. J. table 1. New Jersey Agricultural Experiment Station, potato variety trials, 1953, Middlesex County.

Variety	Seed source	Yield per acre			
		U.S. No. 1	U.S. No. 1	Total	Dry matter
		Pct	Bu.	Bu.	Pct.
1301	Wisconsin	43	77	180 <u>1/</u>	16.4
La Soda	"	73	187	255 <u>2/</u>	16.6
Chippewa	"	54	141	262 <u>3/</u>	15.9
Cobbler	Maine	82	188	229	18.2
Chippewa	"	80	204	255	16.4
Gr. Mountain	"	73	161	219 <u>4/</u>	18.3
Cherokee	"	68	129	189 <u>5/</u>	18.3
Kennebec	"	80	202	252	16.5
Chippewa	New Jersey	82	247	301	16.9
Katahdin	"	86	222	258	16.4
Katahdin	Maine	87	244	281	16.0
Keswick	"	90	227	252	17.7
Mohawk	"	85	187	220	17.9
Sebago	"	86	205	238	15.9
Pungo	"	81	208	256	18.5
Keswick	U.S.D.A.	91.4	238	260	--
Canso	"	88.5	241	272	17.9
B 355-35	"	84.1	229	272	17.3
B 355-44	"	72.7	134	185 <u>6/</u>	17.6
B 962-3	"	81.4	133	163	18.5
B 991-3	"	80.6	136	169	18.8
B 922-6	"	91.5	224	245	18.1
B 606-67	"	73.1	251	343 <u>7/</u>	17.6
B 926-9	"	80.9	215	266 <u>8/</u>	17.6
X96-56	"	84.3	192	228	19.7
B 637-14	"	79.4	195	245	18.8
B 962-32	"	71.5	104	145	18.1

L.S.D. at 5% = 55 bu. for the commercial sources of seed.

L.S.D. not determined for U.S.D.A. source since only 1 plot of each was planted.

<u>1/</u> 34% B's, 4% knobby, 5% scab.	<u>5/</u> 25% B's
<u>2/</u> 16% B's 4% scab.	<u>6/</u> 21% B's
<u>3/</u> 15% B's, 26% scab.	<u>7/</u> 9% knobby
<u>4/</u> 16% B's, 4% scab.	<u>8/</u> Slightly spongy and severe sprouting.

3 replicates of all but U.S.D.A. seed which had 1 replicate.

were fertilized with 1,500 lbs. of 8-16-16 per acre and were harvested on September 30, after all varieties were mature. The soil is a Collington loam. Yields were obtained from 1/120 acre plots.

Highest yields were produced by the Pungo, Chippewa, and Sebago varieties from Maine (N.J. table 2). The Pungo variety, however, produced 6% spongy and knobby tubers at this location. The Cherokee variety produced the highest percentage of B-size tubers --35%.

N.J. table 2. New Jersey Agricultural Experiment Station, potato variety trials, 1953, Monmouth County.

Variety	Seed source	Yield per acre			
		U.S. No.1	U.S. No.1	Total	Dry matter
		Pct.	Bu.	Bu.	Pct.
Cobbler	Maine	82	167	205	17.7
Chippewa	Maine	82	188	230	16.5
Green Mountain	Maine	72	103	143 $\frac{1}{2}$	16.5
Cherokee	Maine	56	97	173 $\frac{2}{2}$	16.8
Kennebec	Maine	80	164	205	16.2
Katahdin	Maine	79	163	206	15.1
Keswick	Maine	79	164	208	16.8
Mohawk	Maine	80	106	133	16.2
Sebago	Maine	80	184	229 $\frac{3}{3}$	15.6
Pungo	Maine	76	190	251 $\frac{3}{3}$	17.1

L.S.D. not determined (2 reps.)

1/ 18% B's, 6% scab. 2/ 35% B's. 3/ 15% B's, 6% spongy and knobby.

The test in Mercer County was on the Franklin Scott farm. The soil is a Sassafras loam with a reaction of pH 5. in the test area. The test was planted on April 21 and harvested on September 16, and yields were obtained from 1/120 acre plots. The potatoes were fertilized with 1400# of 7-14-14 fertilizer per acre.

The 12 varieties were planted in duplicate 2-row plots each 300 feet long, as in Monmouth County test. However, in this test half of each variety was irrigated 5 times with 1 to 1 1/4 inches of water at each application by means of light-weight movable pipe, equipped with rotary sprinklers.

It is of particular interest to note that the average increase in yield of U.S. No. 1 tubers due to the irrigation was 113 bushels per acre (N.J. table 3).

The Kennebec variety produced the highest yield under irrigation, namely 570 bushels per acre, 95% or 550 bushels of which were U.S. No. 1. This was 160 bushels No. 1 more than was produced without irrigation. Other varieties producing higher yields under irrigation were Katahdin, Pungo, Green Mountain, Chippewa, and Irish Cobbler. (N.J. table 3)

The use of irrigation had the greatest effect on the yields of Pungo, Green Mountain, and Kennebec, with yield increases ranging from 194 to 160 bushels per acre. Irrigation had the least effect on the yields of Sebago and Mohawk, yield increases of U.S. No. 1 of these varieties being 41 and 63 bushels per acre, respectively.

That the non-irrigated portions of the potatoes on this farm produced much higher yields than those on the two other farms is not readily explainable. However, it is suspected that some water may have run along the rows into the non-irrigated areas from the adjoining irrigated areas and thus increased the yields.

It is of considerable interest to note that the use of irrigation increased the dry-matter content of most of the varieties in this test.

Statistical analyses of the tests in Mercer and Monmouth Counties were not conducted because of the nature of the plot design and that only 2 replicates were planted.

N. J. table 3. New Jersey Agricultural Experiment Station, potato variety trials, 1953, Mercer County.

Variety	Seed source	Yield per acre, irrigated				Yield per acre, not irrigated			
		U.S. #1	U.S. #1	Total	Dry matter	U.S. #1	U.S. #1	Total	Dry matter
		Pct.	Bu.	Bu.	Pct.	Pct.	Bu.	Bu.	Pct.
Cobbler	Maine	94	455	485	18.4	91	346	379	17.9
Chippewa	"	93	457	493	16.4	89	334	374	15.8
Gr. Mountain	"	91	476	521	19.6	74	315	421 ^{1/}	18.9
Cherokee	"	78	359	461 ^{1/}	18.3	70	250	351 ^{2/}	17.9
Kennebec	"	95	550	570	18.5	95	390	412	17.5
Chippewa	New Jersey	91	396	433	16.9	83	272	327 ^{3/}	16.7
Katahdin	"	94	429	458	17.2	93	360	385	16.6
Katahdin	Maine	95	515	543	17.4	95	447	470	17.7
Keswick	"	92	438	374	19.1	93	307	330	18.7
Mohawk	"	94	383	407	20.0	92	320	346	18.9
Sebago	"	91	377	416	17.9	95	336	354 ^{4/}	16.6
Pungo	"	94	482	515	19.7	78	288	371 ^{4/}	16.9
L.S.D. not determined (2 reps.)									

1/ 16% B's

481 ave. total yield

443 " U.S. No. 1.

1/ 15% B's 7% knobby

2/ 21% B's

3/ 14% "

4/ 15% "

377 ave. total

330 " U.S. No. 1.

NEW YORK

M. W. Meadows, J. Howard Ellison and R. L. Sawyer

Potato variety trials were conducted in 8 counties of New York State in co-operation with county agricultural agents of the respective counties and the Long Island Vegetable Research Farm in Suffolk County.

Seed of all varieties and seedlings were obtained from the U.S.D.A. Station at Presque Isle, Maine, except for Canoga that was furnished by Dr. J. R. Livermore of Cornell.

Plot size consisted of a single row 34 inches wide and 30 feet long, with the exception of Erie County where the plot size was 25 feet long. Seed was spaced 9 inches apart in the row. Plots were replicated 5 times in Essex, Erie, Monroe, and Suffolk Counties and 4 times in the remaining counties. Yield data were used from only 3 replicates in Niagara County because of flood damage to one replicate.

Samples were taken from 3 replicates of each trial and dry-matter content was determined with a potato hydrometer.

Yields and dry-matter content are given in New York tables 1 and 2, respectively.

Among the early varieties, Cherokee and Keswick, although not quite as early as Irish Cobbler, gave similar performance in yield and dry-matter content. Under good growing conditions, the tuber shape of Cherokee and Keswick is slightly better than that of Cobbler, but under adverse conditions, all tend to be rough.

B 447-98 produced rough tubers under adverse conditions.

B 75-4 matured very early and in some locations exhibited a weakness to produce growth cracks.

Of the midseason to late-maturing varieties, Kennebec continues to be a high yielder with the usual trouble from oversize and rough tubers. The variety definitely requires special treatment and good growing conditions. Indications are that much can be accomplished by close spacing, irrigation, and possibly use of less fertilizer.

Green Mountain, B 2431-42, B 73-18, and B 607-56 produced rough tubers. B 73-18 is of interest, however, because of its high dry-matter content. Tuber shape of this seedling is decidedly better than that of Green Mountain, although average yield was rather low.

Teton performed very satisfactorily in respect to yield and tuber shape. Dr. W. C. Jacob and his co-workers at Cornell have found it to be very susceptible to pressure bruise or black spot.

Canoga has performed very satisfactorily in tuber quality and yield but has not experienced any perceptible increase in acreage.

Houma, under good conditions, is an excellent potato but is rather undesirable in a hot dry season, such as was experienced in New York during 1953. The variety sets very heavy, consequently producing many small unsaleable potatoes.

New York table 1. New York potato variety trials, 1953.

Variety	County and dry-matter content								
	Essex Solids	Erie Solids	Monroe Solids	Suffolk Solids	Allegany Solids	Genesee Solids	Steuben Solids	Niagara Solids	Ave. Solids
Early	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Cherokee	17.7	20.1	19.2	15.7	19.0	19.9	19.9	17.7	18.6
Keswick	17.9	18.2	18.9	16.7	18.9	19.2	19.4	17.7	18.4
I. Cobbler	17.4	19.7	18.7	16.0	18.2	18.4	20.4	16.9	18.2
B 447-98	17.2	19.0	18.2	15.7	17.7	18.2	17.9	17.2	17.6
B 75-4	18.2	18.9	19.0	17.4	--	--	--	--	18.4
Mid to Late									
Kennebec	18.4	19.2	18.7	16.9	19.4	19.9	19.7	17.9	18.8
Gr.Mountain	19.2	18.7	20.7	17.9	21.2	21.9	19.9	19.4	19.9
Teton	16.9	17.2	17.9	14.7	17.7	18.7	18.7	17.4	17.4
Canoga	17.9	18.7	18.7	--	18.7	--	18.9	20.1	18.8
B2431-42	17.2	17.7	16.7	15.4	--	--	--	--	16.7
Houma	17.4	17.7	18.2	17.2	--	--	--	--	17.6
Katahdin	17.2	17.9	17.7	14.1	17.4	18.7	19.1	17.4	17.4
B 73-18	18.7	21.2	20.9	17.2	--	--	--	--	19.5
B 607-56	15.7	16.7	16.7	13.3	17.9	18.4	17.2	17.9	16.7

Katahdin gave its usual unspectacular performance in yields but excelled all others in tuber shape and appearance.

New York table 2. New York potato variety trials, 1953. Average yield in bushels per acre, U. S. No. 1.

Variety	County and average yield per acre U.S. No. 1								
	Essex	Erie	Monroe	Suffolk	Allegany	Genesee	Steuben	Niagara	Average
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
<u>Early</u>									
Cherokee	519	304	374	223	313	453	597	430	402
Keswick	456	214	396	352	232	552	578	430	401
I. Cobbler	382	289	373	308	361	502	544	387	393
B 447-98	420	221	355	241	345	397	514	308	350
B 75-4	413	63*	281	233	-	-	-	-	247
<u>Mid to Late</u>									
Kennebec	644	481	573	457	577	571	707	523	567
Gr. Mountain	584	425	558	326	621	680	570	355	515
Teton	490	352	519	407	569	490	676	413	489
Canoga	455	404	498	-	369	--	549	484	460
B 2431-42	531	368	485	404	-	--	--	- -	447
Houma	501	406	434	427	-	--	--	--	442
Katahdin	453	376	493	348	367	472	597	391	437
B 73-18	433	381	436	233	-	--	--	--	371
B 607-56	518	145	489	177	198	336	521	405	349
L.S.D. 19:1	91.0	82.0	91.2	55.0	171.4	106.7	83.3		
" 99:1	121.0	109.0	121.3	74.0	231.6	144.2	112.5	N.S.	

*Very poor stand

NEW YORK
J. R. Livermore

The growing season in 1953 was comparable to the usual California weather comment: "most unusual". The plants had a good start and made normal growth through July, but in August there was a severe drought lasting over 4 weeks, during which time there was a 10-day period of day temperatures over 90°.

The principal objective of the potato-breeding project in the Department of Plant Breeding is to produce an early maturing, high-quality, heavy-yielding strain of potatoes.

Last year we introduced into our greenhouse breeding beds some new early lines which were obtained from Fred A. Krantz. These lines were quite fertile, so we have seed from several crosses which were made in the spring of 1953. Under normal procedure these seedlings will not appear in the field until 1955. It has been quite difficult to develop earlies which are capable of producing high yields.

Because of the heat and dry weather it was a good season to separate out the better lines, particularly those strains which were resistant to the potato leafhopper. We have many seedlings which stay green much longer than the susceptible types. Under such extremely favorable weather conditions for leafhoppers, as prevailed this year, many of these resistant lines succumbed eventually. However, on September 14, when we killed the vines, there were two or three sorts which hardly had been injured at all by the leafhoppers.

The search for leaf-roll resistance continues. U.S.D.A. seedling B 24-58, obtained from Donald Folsom continues to show high resistance, or complete masking. Each year it is inspected in the field and indexed in the greenhouse. The pathologists have not yet found a single plant with leaf-roll symptoms. Maybe this is the year it will break, but in the meantime we shall continue to use it in our breeding plots as the best source of leaf-roll-resistant germplasm.

Yielding ability is extremely important in any potato variety. No matter what its other good qualities may be, the new variety must produce a large crop. The best way to reduce production costs is through the use of heavy-yielding varieties. On the other hand, there is little point in raising large crops of potatoes that the public refuses to buy. Mayhap the potato breeder has minimized the importance of eating quality and has subordinated it to disease resistance, or high yield, or tuber appearance, or whatnot. In any event, public reaction has reached the point where even our local newspaper, the Ithaca Journal, has published an editorial that too many of the new, blight-resistant varieties produce poor eating potatoes.

Whatever the merits of the case may be, certain it is that the consumer is eating fewer potatoes. When State of Maine potatoes and Long Island tubers move out of the storage houses in the middle of the winter at 80 cents a barrel and 90 cents a hundredweight, respectively, something is decidedly wrong. At the same time the high-quality Russet Burbank from Idaho starts rolling at \$1.80 per hundred, f.o.b. Twin Falls or Burley.

A simple answer might be that there are too many potatoes but I think it is not so simple. The other side of the argument would be that there is too little demand. Could it be that the lesser demand might be due to the shortage of old-fashioned Green Mountains and the surplus of Katahdins or some other new variety? Someone will immediately say that the Green Mountain, with its net necrosis, is no longer any good. In general, that may be true but there are still a few farmers who can raise crops of Green Mountain as they were 25 years ago, and that is the quality about which I am writing.

In all fairness to the potato breeder, it must be stated that there is another very important factor contributing to the relatively poor cooking quality of the present-day potato. That factor is the combined effect of the cultural practices in use today. It has been said by an eminent authority on potato quality that almost everything the farmer does to increase the yield is detrimental to cooking quality. To list but ^{ing} a few of these: (1) Heavy applications of highest fertilizers; (2) prolonging the life of the vine through the use of the newer insecticides; and (3) sudden death or killing of the vine by rotobating, burning, or chemical applications and then digging too soon after killing the vines. However that may be, I repeat, a little more effort on eating quality would be helpful.

The Canoga acreage is increasing slowly. Everyone who has tried it has reported favorably as to its quality. Maybe I should express it in another way; all reports which I have received have been favorable. To do the best, the Canoga should be planted early and have plenty of water during the growing season.

A half-year sabbatic, plus a bit of vacation, will keep the writer away from Ithaca from February 1 to about the middle of September. If your letters go unanswered, that might be the explanation. It is planned to visit several potato research centers.

NEW YORK

L. C. Peterson, M. K. Corbett and A. P. Pieringer

Late blight was absent from our plots with the exception of the one located on the South Fork of Long Island, an area notable for the annual occurrence of this disease. Even here, the amount of late blight infection was so small that the disease was actually insignificant.

Rainfall was very spotty during the past growing season. Long Island and central New York suffered from drought, while in parts of southwestern New York the amount of rainfall approached normal. Our selection and increase plots in Richford, New York, suffered from an excess of rain in April and May, followed by a drought which lasted throughout the rest of the season. This, together with periods of abnormally high temperatures, had its effect on yields which, especially among the varieties of early and mid-season maturity, were very poor. The heat and drought combined to make intelligent roguing and selection almost impossible.

Blight

Races of Phytophthora infestans and their relationships to the three major genes for blight resistance identified in our Solanum demissum derivatives have been previously described (Mills-National Potato Breeding Program 1951). The object of the blight program was to combine into one horticulturally acceptable variety the three known resistance factors of S. demissum. Several hundred seedlings considered as immune from all of the currently known races of P. infestans existing in New York have been grown for two years under field conditions. Some of these were included in yield trials this year and found to produce a very satisfactory crop.

Evidence on the permanence of this degree of resistance was recently reported by Mills (National Potato-Breeding Program 1952). Plants of the R_1R_2 and $R_1R_2R_4$ genotypes, while immune in Pennsylvania or New York, blighted when grown in the Toluca Valley of Mexico. Since races of P. infestans capable of infecting these genotypes are known to exist, it is probable that they will appear in New York. They can be expected when the resistant types have been built up to a rather large acreage and this situation coincides with a series of years favorable for the development of epiphytotics of late blight.

Virus

No good usable source of resistance to the leaf roll virus has been found among the many solanaceous plants which have been tested. Crossing varieties and seedlings possessing some resistance to the leaf roll virus has been continued. Seedlings were grown in rows alternating with plants infected with leaf roll. Viruliferous aphids were introduced into the plot, and the aphid population remained high throughout the season. Results of the tuber-index trials indicate that a very small number of seedlings survive this exposure and of these only a few survive the second exposure without contracting leaf roll. All of

those which survived three years of exposure were infected with the leaf roll virus when the inoculations were made by means of caged, viruliferous aphids.

A usable source of resistance to virus Y, other than a hypersensitive reaction following mechanical inoculation, has not been found among the solanaceous plants tested. Some potato varieties which possess this hypersensitive reaction to the virus have been used as parental material. The seedlings produced have been inoculated mechanically with virus Y. Some are hypersensitive to one or two strains of the virus and become systemically infected with other strains of the virus. It has been determined in all of the cases tested so far that those seedlings which possess a hypersensitive reaction to all of the strains used become systemically infected when inoculations are made by means of caged viruliferous aphids. The same results have been obtained in field exposure trials.

Golden Nematode

Many potato varieties and solanaceous plants have been tested by Dr. W. F. Mai for their resistance to the golden nematode (Heterodera rostochiensis). Only two of these, Solanum Ballsii and S. suurense, are resistant enough to be used in a breeding program. Recently it has been reported from Europe that four collections of S. andigenum are resistant to the nematode. Seed of these collections have been obtained for use by Dr. Hougas, of the Potato Introduction Station. These collections have not been evaluated as yet. Solanum Ballsii is very resistant to the nematode. All attempts to self or cross this species have resulted in failure. Solanum suurense possesses 48 chromosomes and crosses readily with standard potato varieties. It varies, however, in its reaction to the nematode. Seven inbred lines of this species, characterized by low infection reading maintained over a four-year period, have been selected for further breeding work. Crosses have been made and seedlings currently are being tested by growing in soil heavily infested with the nematode.

NORTH CAROLINA

F. L. Haynes

The primary concern of this project is to find an early, smooth, high-quality variety to replace Irish Cobbler for the early commercial areas of the State. Some progress is being made in improving yields and appearance, but advances in shipping and eating quality have been more difficult to obtain. Several breeding lines appear promising in all respects. N. C. tables 1, 2, and 3 are summaries of results in the early commercial area.

NC 880-4 (TI5 x B 231-3) continues to perform well in the mountains. (N.C. table 4) The line has consistently produced high yields for three seasons and has resistance to the locally prevalent strain(s) of the late blight organism. It has exceptionally good keeping quality. The line has a long period of tuber dormancy that is rather difficult to break. This contributes to its storage quality but also causes slow emergence after planting, and in some cases, poor plant stands. The naming and release of this variety are anticipated as soon as the proper storage and handling conditions for seed are learned. A large supply of seed tubers is available for distribution in experimental lots.

N.C. table 1. Yield test at Aurora, N. C., 1953. Plots 1/125 acre, 4 replications in randomized block design. Planted February 27, harvested June 16.

Variety	Average yield per acre		
	U.S. No. 1 size A	Dry matter	Maturity
	Bu.	Pct.	
LaSoda	446	16.5	Mid-season
Essex	422	16.9	Late
NC 880-3	363	15.4	Early
NC 2606-3	355	17.7	Mid-season
Sebago	347	16.9	Late
B 73-10	332	18.9	Mid-season
Bliss Triumph	314	17.5	Early
I976-6	300	18.2	Mid-season
White Cloud	287	19.2	Early
NC 2157-4	275	18.6	Late
Irish Cobbler	273	19.4	Early
L.S.D. at .05%	17		
" " .01%	63		

C.V. for yield = 9.6%

N. C. table 2. Yield test at Camden, N.C., 1953. Plots 1/125 acre, 4 replications in randomized block design. Planted March 10, harvested June 30.

Variety	Average yield per acre		Maturity
	U.S. No. 1 size A	Dry matter	
	Bu.	Pct.	
LaSoda	536	14.8	Mid-season
Essex	527	15.0	Late
NC 880-3	518	14.5	Early
B 73-10	507	17.7	Mid-season
Bliss Triumph	482	14.8	Early
White Cloud	481	16.7	Early
NC 2191-47	452	16.7	Mid-season
Sebago	409	15.3	Late
I976-6	405	16.7	Mid-season
Irish Cobbler	379	16.9	Early
NC 2157-4	342	17.9	Mid-season
L.S.D. at .05	44		
" at .01	59		

C.V. for yield = 6.6%

N.C. table 3. Yield test at Plymouth, N. C., 1953. Plots 1/500 acre, 4 replications in randomized block design. Planted March 11, harvested June 22.

Variety	Average yield per acre		Maturity
	U.S. No. 1 size A	Dry matter	
	Bu.	Pct.	
NC 2609-36	394	17.4	Mid-season
Essex	353	15.8	Late
NC 2170-1	346	17.7	"
NC 2191-47	307	16.9	Mid-season
NC 2647-40	291	16.9	"
NC 2600-7A	277	17.6	Late
NC 2647-56	277	17.4	"
Sebago	271	15.8	"
NC 2600-13A	259	20.1	Early
NC 2653-86	259	17.6	Mid-season
Bliss Triumph	245	14.8	Early
NC 2404-25	236	18.8	"
B 91-14	232	16.9	Late
NC 2403-9	225	17.6	Early
NC 2635-2	225	18.9	"
NC 2600-11	222	19.4	Early

N.C. table 3 continued

Variety	Average yield per acre		Maturity
	U.S. No. 1 size A	Dry matter	
	Bu.	Pct.	
NC 880-3	211	15.0	Early
NC 901-1	204	17.5	"
Irish Cobbler	199	18.7	"
NC 2603-14	188	16.9	"
NC 2612-3A	186	18.6	"
White Cloud	172	19.0	"
NC 2612-1	147	19.0	"
NC 2612-5	147	16.4	"
NC 2189-2	135	17.2	"
NC 2651-40	131	17.6	"
NC 1256-4	115	16.2	"

L.S.D. at .05

52

" 2 .01

69

C.V. for yield = 15.9%

N.C. table 4. Yield test at Hendersonville, N.C., 1953. Plots 1/250 acre, 4 replications in randomized block design. Planted April 16, harvested August 11.

Variety	Average yield per acre		Maturity
	U.S. No. 1 size A	Dry matter	
	Bu.	Pct.	
NC 2170-1	315	16.9	Late
Kennebec	307	17.7	"
NC 2670-11	300	16.5	"
NC 2417-76	290	15.0	"
NC 880-4	289	16.9	"
NC 2170-3	280	14.3	"
NC 2606-3	256	15.5	"
NC 880-8	252	16.2	"
Green Mountain	238	19.5	"
Sequoia	230	16.9	"
B 73-10	228	18.4	Mid-season
NC 2157-5	217	15.4	Late
Bliss Triumph	208	17.2	Early
Essex	206	15.0	Late
Sebago	205	16.2	"
NC 911-6	189	15.0	Mid-season
NC 2413-71	176	15.5	Late
NC 2117-4	130	15.4	Mid-season

L.S.D. at .05

57

" " .01

76

C.V. for yield = 17%

Twenty-four seedling varieties that were grown at Crossville, Tenn., in 1952 were received from T. P. Dykstra and grown in observation plots in North Carolina. The Tennessee-Louisiana numbers 1393, 1859, 2349, 3954 were selected to be grown in replicated plots in 1954. Numbers 3597, 3693, 3769, 4113, and 4463 will be planted again for observation. All others were discarded.

NORTH DAKOTA
W. P. Baird

In 1953 28 varieties of potatoes were tested at the Northern Great Plains Field Station, Mandan, N. Dak. Each variety was replicated 5 times in randomized blocks. The results of this test are shown in North Dakota table 1, in which varieties are arranged in order from the highest yielding to the lowest yielding. Despite a better than average amount of rainfall, potato yields were below average, and the starch content was comparatively low. The first killing frost occurred September 21.

North Dakota table 1. Potato variety trials at the Northern Great Plains Field Station, Mandan, North Dakota, 1953.

	Average yield U.S. No. 1 per A	No. 1 compared with total	Starch
	Bu.	Pct.	Pct.
Sequoia	155	86	12.2
Kennebec	139	81	13.9
Russet Rural	137	77	14.2
Fontiac	136	82	9.7
Rural New Yorker	135	79	14.5
White Rose	131	76	10.2
Chippewa	127	74	11.0
U.S. 46952	125	83	10.2
Erie	120	67	15.4
Norkota	115	72	13.4
Katahdin	100	79	10.7
Teton	97	56	11.9
Irish Cobbler	97	60	13.2
Sebago	96	79	11.1
Mohawk	95	82	12.2
Red Warba	94	70	12.6
Warba	93	63	12.2
Earlaine #2	93	72	10.0
Earlaine	89	71	11.1
Pawnee	89	61	11.2
Early Gem	88	76	10.7
Houma	86	64	14.7
N.D. 457-1	81	64	12.7
Triumph	80	70	11.2
Mesaba	76	55	13.2
Kasota	50	44	11.5
Progress	48	36	10.7
Cherokee	38	33	13.2

L.S.D. 5%, 20 bushels.

" 1% 27 "

Spacing: Rows 3½'; hills 18". Plots: 37½' long; 25 hills per plot.

NORTH DAKOTA
W. G. Hoyman

Introduction

The 1953 growing season had an abundance of rain during June with less than the normal amount during July and August. Observations throughout the Red River Valley indicated the excess moisture caused considerable seedpiece rot at certain locations, especially where water stood on the fields. Very little rain during September and October made it possible to harvest over a long period without encountering adverse weather. Over half of the crop was harvested with mechanical harvesters.

There was very little current-season infection of leaf roll and virus Y, and observations during the growing season indicated aphids were very scarce in potato fields.

Purple-top wilt appeared in the latter part of July and was probably the most prevalent since 1947. As much as 20 percent was reported in one planting of Red Pontiac. Six-spotted leafhoppers were common and aster yellows were severe. The new variety Redkote appeared to be quite susceptible but Early Gem had less purple-top wilt than any variety observed in commercial plantings. This observation was of considerable interest because Early Gem was named in April and nothing was known regarding its resistance to the aster-yellow virus..

Dr. J. R. Wallin, of the Federal Plant Disease Forecasting Service, forecast late blight in the Red River Valley provided the inoculum were present. An inspector of the North Dakota State Seed Department reported the disease on potato foliage at Reynolds the latter part of August but none was observed at Northwood. During the Northwood harvest several thousand tubers were observed for scab infection and 4 were found with symptoms of late blight. Late blight tuber rot caused considerable loss in a warehouse 15 miles from Northwood.

Common scab is becoming a limiting factor in the growing of potatoes at certain locations in the Red River Valley. Some growers have reduced their acreage of Irish Cobbler, Triumph, and Red Pontiac because of this disease and are substituting Cherokee and Osage. Early Gem is also being grown in some areas where scab is a problem. This variety appears to be better adapted to areas where the soil is sandy.

Scab Tests

The 1953 scab tests were conducted at Fargo and Northwood. The Fargo plot contained U.S.D.A. selections and varieties, advanced selections from the Department of Horticulture and the stock included in the national scab trial. An abundance of rain during the spring made it impossible to plant

the Fargo plot until June 11. More moisture following planting caused most of the seed to rot. Only some U.S.D.A, selections on the south edge of the plot were saved. B 2162-36 was the most resistant of this group with a reading of 1-1.

Several new selections obtained from the U.S.D.A. Field Station, Presque Isle, Maine, the fall of 1952, were planted at Northwood. N. Dak. table 1 compares the reported resistance obtained at Presque Isle with the Northwood readings. The results indicate that a selection highly resistant in Maine is not always resistant to the scab organism occurring in the Northwood soil. Only 3 selections and Early Gem had type 1 resistance. The new red-skin variety Redkote was more resistant than Red Pontiac. A 4-2 reading for Cherokee was the most infection ever observed on this variety in North Dakota.

N. Dak. table 1. Scab readings of selections and varieties grown at Northwood, N. Dak., 1953.

Variety	Reported resistance	Northwood reaction	Variety	Reported resistance	Northwood reaction
B 2067-1	1-1	tr-1	B 3114-15	tr-1	1-3
B 2067-133	1-2	1-2	B 3158-10	tr-1	tr-2
B 2162-3	1-2	2-2	B 3159-1	0-0	tr-1
B 2162-36	tr-1	2-2	B 3160-12	tr-2	3-2
B 2368-4	1-2	2-3	B 3167-28	tr-2	1-3
B 2368-11	1-2	2-2	B 3168-9	tr-2	tr-1
B 2368-13		4-2	B 3170-5	tr-2	2-3
B 2861-1	tr-1	4-2	B 3170-8	tr-2	2-2
B 2875-6	tr-1	5-2	B 3170-11	0-0	4-2
B 2894-24	1-1	Rogued	B 3170-20		4-2
B 2876-1	1-1	3-2	B 3170-33	tr-2	3-2
B 2997-9	0-0	Rogued	B 3172-2	tr-1	3-2
B 3092-35	1-2	1-4, 4-2	B 3172-3	1-2	3-4
B 3097-11	tr-1	5-2	B 3194-5	0-0	1-4, 5-2
B 3097-16	tr-2	5-2	B 3194-12	0-0	4-2
B 3107-17	tr-1	5-2	B 3194-20	tr-1	5-2
B 3114-35	tr-1	5-2	B 3199-7	1-2	4-2
B 3114-52	tr-2	5-2	B 922-3		1-3
B 3116-42	tr-2	3-2	B 922-6		2-3
B 3124-9	1-1	1-3	B 922-18		1-3
B 3131 N1		1-2	X927-3		1-3
B 3131 N2		2-2	41956		1-4
B 3131 N3		2-2	Early Gem		1-1
B 2131-21	1-2	3-2	Red Warba		3-3
B 3139-24	tr-2	3-2	Redkote		3-2
B 3137-13	1-2	tr-2	Red Pontiac		1-4
B 3140-30	tr-2	1-3	Kennebec		5-2, 3-3
			Cherokee		4-2

Also included in the Northwood scab test were 124 selections and the new variety Manota. This stock was obtained from the Department of Horticulture in order to test its reaction in the Northwood soil. Among this group, ND2475-8 was the most resistant with a reading of 2-1. Four other selections having a high degree of resistance were ND457-1-35, ND1906-1, and ND19100-3. Each had a reading of 1-2. The 1-3 reading for Manota indicated it was susceptible to the scab present in the Northwood soil.

Bacterial Ring Rot

In cooperation with the Department of Bacteriology, an investigation was started to determine if resistance and susceptibility to the bacterium, Corynebacterium sepedonicum, causing ring rot, are functions of the nutritional environment provided by the host. The first phase of the study was a determination of the amino acid composition of susceptible Triumph and a resistant seedling. The method employed for the amino acid determination was that of paper partition chromatography using plant juices from macerated tissues.

The results have shown that both Triumph and the seedling are very similar in the types of free amino acids present, but differ decidedly in relative amounts and especially in the amount of two of these acids. The following amino acids were found: aspartic, serine, asparagine, arginine, glutamine, gamma amino butyric acid, proline, and either part or all of the leucines and valines.

Equal concentrations of the valines and leucines were present in Triumph and the seedling but the latter had a higher level of all other amino acids except proline. Triumph was rich in proline and the seedling had a high level of asparagine.

Virus-Free Foundation Seed Stock

The varieties Red Pontiac, Red Warba, Kennebec, Cherokee, and Early Gem are maintained free of virus X and other viruses as a source of foundation seed for certified growers. The new variety Redkote was added to the list in 1953. Ninety-nine tubers were received from Ben Picha, Grand Forks, N. Dak. When indexed on Gomphrena globosa they were found to be free of virus X. Any new varieties that appear to be adapted to North Dakota will be included in this program.

When virus-free tubers are released to certified growers the question arises as to the length of time the stock will remain free of virus X. This will depend upon the precautions the grower follows and especially if he is growing an old variety infected with the virus. In January 1953, to partially answer this question, 105 Kennebec seedpieces were sent in by Robert Ekre, a certified grower in the western part of the State. Mr. Ekre first obtained 20 virus-free seedpieces of this variety the spring of 1949. Due to the presence of Fusarium dry rot, only 71 plants were obtained and all were found to be free of virus X.

In 1947, Mr. Ekre obtained 4 Red Pontiac tubers from an inspector of the North Dakota State Seed Department. A small portion of the increase was indexed for virus X in 1949 and all 74 plants were free of the virus. The original

4 tubers must have been free of virus X. In January 1953, 101 tubers of this same stock were indexed, and all were virus-free. Although the random samples in these tests were small, the results indicate it may be possible for a certified grower to maintain seed free of virus X.

Seedling Inoculations With Virus X

In cooperation with the Department of Horticulture seedlings having B 606-37 as one parent were inoculated with virus X. The severe strain T1 used for the inoculations was obtained from Dr. R. G. Timian. The results are shown in N. Dak. table 2. Seedlings showing no virus-X symptoms will be increased, and any promising selections will be tested to be certain they are not symptomless carriers.

N. Dak. table 2. Virus-X inoculation of Department of Horticulture seedlings

Pedigree	Parentage	Clones symptomless	Clones with symptoms
		No.	No.
ND3022	B 606-37 x ND457-1	20	14
ND3025	" x ND1287-6	7	9
ND3026	" x ND1465-1	6	9
ND3027	" x ND2069-57	15	10

Federal seedlings having 41956 as one parent were also screened for resistance to the T1 strain of virus X.

Late-Blight Tests

In cooperation with the Department of Horticulture, approximately 300 North Dakota selections were screened for resistance to late blight. The late-blight isolate was furnished by Dr. J. R. Wallin, Division of Mycology and Plant Disease Survey, and was isolated from a North Dakota tuber. Of the selections 60 showed no infection. Progenies having GQT, B 922-3, and 2TG-15 as one parent had the highest degree of resistance.

Several Federal selections being increased in North Dakota were also tested for resistance to the same isolate and all were susceptible. Included in the test were the varieties Kennebec, Cherokee, Early Gem, Redkote, LaSoda, and the Cavalier tomato. They were also susceptible to the North Dakota isolate.

Virus-Y Tests.

Preliminary field experiments with the green-peach aphid, Myzus persicae failed to establish that ND457-1 became infected with the severe Y530 strain of virus Y. Mechanical inoculations in the greenhouse were positive.

Further transmission experiments with the green-peach aphid were conducted in the greenhouse the spring of 1953. The aphids were cultured on ND530, a selection that harbors Y530. Ten or more aphids were transferred to each of 45 plants of ND457-1 soon after the sprouts emerged from 4-inch pots. The transfers were made June 17 and the potted plants were taken to the field and planted June 19. They were not fumigated when removed from the greenhouse. Y-carrying aphids were also placed on 6 virus-free Red Pontiac plants June 17 and they were transplanted to the field June 19.

The first virus-Y symptoms appeared on 2 of the 6 Red Pontiacs July 9. Four of the 41 surviving plants of ND457-1 showed typical symptoms August 8. By August 22 an additional plant was showing infection and by September 11 another plant was showing necrosis. Approximately 14 percent of the plants showed symptoms, whereas all of the Red Pontiacs were diseased by September 11. Four of the Red Pontiacs had current-season field infection.

The 21 inbred lines of ND457-1 shown in N. Dak table 3 were tested for resistance

N. Dak. table 3. Occurrence of virus -Y symptoms on inbred lines of ND457-1.

Variety	Plants infested	Plants showing virus-Y symptoms			
		July 9	July 21	Aug. 8	Sept. 11
	No.	No.	No.	No.	No.
457-1-4	5				
" " 6	5				1
" " 10	5				*
" " 16	3				
" " 22	5			1	1
" " 23	5	4	5	5	5
" " 24	4		1	1	1
" " 26	5				
" " 27	3				
" " 28	4				
" " 30	4				
" " 31	2				
" " 32	4				
" " 33	4				*
" " 34	5				
" " 35	5				
" " 36	5				
" " 37	4				
" " 39	4				
" " 41	4				
" " 42	5				*
Red Pontiac	6	2	2	2	6

to virus Y. Green-peach aphids were cultured on ND530 and 5 or more were transferred to each plant as it emerged from the potted soil. The infested plants were left in the greenhouse 5 days after the transfers were made, and they were not fumigated when taken to the field June 13. Although only a small number of plants of each inbred were tested, the results indicate some may have resistance. All 5 of the plants of ND457-1-23 showed symptoms 32 days after they were taken to the field. Three other inbreds each had one plant showing symptoms while the remaining 17 showed no certain symptoms. All but ND457-1-23 were harvested and will be planted in 1954.

Further research was conducted to find a more satisfactory indicator plant for virus Y. Fifty-six introductions were obtained from the Plant Introduction Station, Ames, Iowa, and mechanically inoculated with the Y530 strain of virus Y. No satisfactory indicator was obtained from this group.

Adaptation Tests With U.S.D.A. Stock

The 3,622 seedling tubers received from F. J. Stevenson and the 58 selections obtained from Chapman Farm, Presque Isle, Maine, were planted on the Aldrich Farm at Northwood. Common scab is severe at this particular location (N. Dak. table 1) and a large percentage of the stock can be eliminated the first year it is planted. The list of federal seedlings grown is given in N. Dak. table 4.

N. Dak. table 4. Federal seedling tubers furnished by F. J. Stevenson

Pedigree	Parentage	Seedlings
		No.
B 3414	Kennebec x B 881-12	150
B 3415	Menominee x B 2429-138	105
B 3418	" x B 881-12	97
B 3419	Mohawk x B 881-12	88
B 3438	B 2067-52 x B 2429-92	84
B 3439	B 2427-23 x B 2067-52	141
B 3442	Ac 25830 x Katahdin	30
B 3444	Ac 25830 x B 2067-52	47
B 3452	B 2162-36 x B 2162-18	91
B 3453	B 2368-2 x B 2162-18	53
B 3454	B 2368-2 x B 2368-17	52
B 3462	Dyk 2687 x B 2368-4	121
B 3463	Dyk 2773 x B 929-32	201
B 3464	" x B 2368-4	123
B 3467	Chippewa x B 2429-92	88
B 3468	" x Ac 25673	13
B 3469	" x Menominee	312
B 3470	" x B 2067-52	292
B 3480	Ac 25931 x (528-170)	168
B 3481	Akabia x B 929-32	84
B 3482	I. Cobbler x Earlane	189

N. Dak. table 4 continued.

Pedigree	Parentage	Seedlings
		No.
B 3483	I. Cobbler x Cherokee	82
B 1386	B 864-2 x Selfed	146
B 1387	B 936-12 x "	170
B 1388	B 2113-9 x "	22
B 1389	B 2946-5 x "	34
B 1390	Ac 25813 x "	32
B 1394	B 402-1 x "	115
B 1396	B 881-12 x "	128
B 1397	B 2067-52 x "	216
B 1398	B 2429-92 x "	188

The 28 single hills saved from the seedling plot are shown in N. Dak. table 5.
 N. Dak. table 5. Single-hill selections saved from the Federal seedling plot.

Pedigree number	Hills	Skin color
	No.	
1386	1	White
1394	1	"
1396	7	Russet
1397	2	White
3141	1	Russet
3419	1	"
3438	1	White
3439	3	"
3453	1	Red
3462	1	"
3463	3	"
3464	1	"
3467	1	"
3470	2	White
3482	2	"

Eight of the 58 selections were saved for further increase. Most of these had a high degree of scab resistance at Aroostook Farm but many did not maintain this resistance at Northwood. Selections to be replanted are B1359N1, B1359N2, B2067-133, B2368-11, B3137-13, B3159-1, B3255N1 and B3333N1.

The 578 seedling tubers furnished by C. E. Peterson (N. Dak. table 6) were planted in the scab-infested Northwood soil. Many of the tubers were not planted because of their small size. Only 3 single hills (1023, 1049, and 1154) were saved from this planting.

N. Dak. table 6. Federal seedling tubers furnished by C. E. Peterson

Progeny No.	Parents	Tubers
I 922	B 773-27 x Neb 117 43-3	49
I 1020 (Green Stem)	X96-56 x B 874-25	55
I 1020 (Red Stem)	" "	33
I 1023	B 400-1 x B 762-46	91
I 1045	B 792-94 x B 874-24	42
I 1046	" x B 874-25	29
I 1048	B 874-24 x Teton	112
I 1049	" x Neb. 49.40	85
I 1084	Neb 225.43 x B 962-9	40
I 1154	B 606-67 x I947-10	42

Early Gem

In a release from the United States Department of Agriculture and the North Dakota and Idaho Agricultural Experiment Stations, dated April 24, 1953, B 515-2 was named Early Gem. The history of this potato has been given in previous annual reports; only more recent information will be included in this report.

Early Gem was first grown in North Dakota in 1948. Approximately 50 farmers had plantings throughout the potato-growing areas of the State in 1953. Purple-top wilt has not been of much concern since 1948 but this year the disease was common in the Red River Valley. Twenty percent was reported by the North Dakota State Seed Department in a field of Red Pontiacs. One percent was the most reported in any field of Early Gem. Since this new variety had an equal opportunity of becoming infected it appears as though it may have resistance to the virus causing this disease.

Because common scab causes severe losses at certain locations, some growers have planted Early Gem and other farmers have shown an interest in the variety. The certified acreage in 1951 was 5.6 and 83.4 in 1952. In 1953 this acreage increased to 445.2. During these 3 years the other russet-skin variety, Russet Burbank, grown in North Dakota, decreased from 122 acres in 1951 to 77 acres this year.

Early Gem did especially well during 1953. Growth cracks was less than usual. From observations throughout the State and trials conducted by the Department of Horticulture, more uniform tuber shape is obtained when the variety is grown on sandy soils.

In tests conducted by the Department of Horticulture over a 4-year period, Early Gem was identical to Red Pontiac in specific gravity, and similar to Irish Cobbler in yield and maturity. In some instances it has matured as early as Red Warba.

NORTH DAKOTA

J. H. Schultz, Robert Johansen, and Eugene Schober

The problem, objectives, and plan of work in potato breeding for North Dakota remains essentially the same as reported in the 1951 report.

State-wide Potato Variety Trials

Six replicated uniform potato variety trials were grown in North Dakota during 1953. These were located at the North Dakota Agricultural Experiment Station at Fargo, Langdon, Minot, with and without irrigation at Williston, and at the Red River Valley Potato Growers' Association research farm at Grand Forks. However, the trials at Fargo and Minot were essentially failures and are not included in the analysis. The Fargo trial failed due to excessively wet and water-logged soil during the early part of the growing season and the trial at Minot failed due to severe hail and water damage on June 30.

Trials were planted as randomized blocks with 4 replications of 25 hills each per variety. Fertilizer was applied at planting time as follows:

Grand Forks, 200 pounds per acre of 0-30-15

Langdon, 500 pounds per acre of 7-7-14

Williston dryland, 200 pounds per acre of 0-45-0

Williston irrigated, 80 pounds per acre of 33-0-0 and 200 pounds per acre of 0-45-0

The total yields in bushels per acre, average percentage U.S. No. 1's and specific gravity of potatoes grown in these trials are reported in Schultz tables 1 and 2, respectively.

Fifteen varieties were grown in trial at all locations except at Grand Forks where an additional eleven varieties were grown. Red Pontiac was again the highest yielding variety, followed by several numbered selections. Cobbler was fifth in rank based on yield, followed by Early Gem. Early Gem yielded better both in terms of total yield and percentage U. S. No. 1 than in previous years. Manota yielded less but not significantly less than Cobbler and Early Gem. It was high among named varieties in terms of specific gravity. It is generally considered to be as good or slightly better than Cobbler in cooking quality. Wisconsin 1301 was the lowest yielding variety in trial, apparently due to its high infection of virus diseases. This selection had bright red color and was of good tuber type. Redkote did not yield as well as in previous years but showed some resistance to common scab. ND92.49-2R and ND2200-1R yielded well in trial but cannot be considered as potential varieties due to other unfavorable characteristics.

Schultz table 1. Total yield in bushels per acre and average percentage U.S. No. 1 potatoes grown in State-wide variety trials, 1953.

Variety	Yield per acre and location				Ave. 4 locations	
	Grand	Langdon	Williston		Yield	U.S. 1
	Forks		Dryland	Irrigation		
	Bu.	Bu.	Bu.	Bu.	Bu.	Pct.
Red Pontiac	400	327	263	464	364	93
ND2200-1R	450	340	214	423	357	89
ND92.49-2R	419	311	242	427	349	94
ND2470-3	403	335	215	425	345	94
Cobbler	391	282	188	455	329	93
Early Gem	403	241	164	447	315	94
ND2104-3R	348	333	199	376	314	90
Redkote	412	273	201	369	314	91
Triumph	385	285	190	389	312	93
ND457-1	362	307	160	381	303	93
Manota	321	288	197	386	298	91
ND2188-2R	329	299	158	365	288	92
ND2124-10R	302	299	180	362	286	84
ND2098-1	332	294	132	363	280	84
W 1301	215	179	120	319	208	85
ND1255-1	499*					
ND2231-2	458*					
ND2080-2	400*					
ND457-1-10	395*					
ND457-1-4	393*					
ND457-1-16	386*					
ND2226-2	366*					
ND1497-2	360*					
ND2387-1	360*					
ND457-1-6	338*					
ND1207-3	292*					
Average	374	293	188	397	311	91
L.S.D. 5%	67.7	113.8	54.1	69.9	39.0	
" 1%	89.9	152.1	72.3	93.5	51.5	

*Not included in Yield Ave. 4 locations

Schultz table 2. Specific gravity of potatoes grown in State-wide trials in 1953^{1/}

Variety	Specific gravity and location				
	Grand Forks	Langdon	Williston		Ave. 4 locations
			Dryland	Irrigation	
Red Pontiac	1.070	1.069	1.091	1.084	1.079
ND2200-1R	1.075	1.070	1.088	1.091	1.081
ND92.49-2R	1.073	1.074	1.088	1.085	1.080
ND2470-3	1.085	1.085	1.095	1.095	1.090
Cobbler	1.083	1.084	1.094	1.094	1.089
Early Gem	1.073	1.073	1.085	1.084	1.079
ND2104-3R	1.070	1.070	1.087	1.087	1.079
Redkote	1.073	1.074	1.093	1.091	1.083
Triumph	1.074	1.075	1.091	1.084	1.081
ND457-1	1.084	1.088	1.098	1.096	1.092
Manota	1.083	1.079	1.095	1.087	1.086
ND2188-2R	1.081	1.073	1.093	1.095	1.086
ND2124-10R	1.081	1.074	1.092	1.094	1.085
ND2098-1	1.082	1.084	1.092	1.096	1.089
W 1301	1.076	1.078	1.088	1.091	1.083
Average	1.078	1.077	1.091	1.090	1.084
L.S.D. 5%	.0059	.0063	.0056	.0050	
L.S.D. 1%	.0082	.0087	.0077	.0070	

^{1/} Specific gravity was determined by the use of the National Potato Chip Institute potato hydrometer, using an 8 pound sample from each of 2 replications.

Three promising white selections were high yielding in the trial at Grand Forks. They are ND 457-1-10, ND457-1-16, and ND2231-2. The first two are sister seedlings and differ chiefly in that the first is very early, maturing with Red Warba, and the second is early, maturing with Triumph. Both have good yield, excellent cooking quality, some scab resistance, and field resistance to virus Y. ND2231-2 has very high yield, combined with high cooking quality, especially for baking, and is of long, smooth-tuber type.

Red Potato Variety Trial

During 1953, 10 named and 18 unnamed red potato varieties were grown in a trial on the Red River Valley Potato Growers' Association research farm near Grand Forks, N. Dak. The trial was planted as randomized blocks with 4 replications of 25 hills per variety.

The 10 named varieties represented all of the named varieties having red skin which are presently available to growers in this area. The 18 unnamed potato varieties represent advanced selections obtained from the potato-breeding projects at the North Dakota, Nebraska, Wisconsin, and Manitoba, Canada, Experiment Stations and from Ben Picha, Grand Forks, N. Dak.

The trial was planted on May 27 and harvested on September 27. Two hundred pounds per acre of 0-30-15 fertilizer was applied in a band form at planting time. Total yields in bushels per acre, percentage U.S. No. 1, and specific gravity of potatoes grown in this trial are reported in Schultz table 3.

The highest-yielding variety or selection was ND888-8-1R which yielded at the rate of 475 bushels per acre, followed by ND2531-1R. Both of these, however, have relatively low specific gravity and will be discarded as lacking in table quality. Three numbered selections had good table quality as measured by specific gravity. These were ND2026-2R, ND2124-2OR, and ND475M2.

Five named varieties, Redburt, LaSoda, Satapa, Sheridan, and Redkote exceeded Red Pontiac in yield but not significantly. Dazoc, Triumph, Progress, and Red Warba were appreciably lower in yield with Red Warba yielding only 235 bushels per acre.

North Central Regional Uniform Potato Variety Trial

In cooperation with potato breeders from North Central States of Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, Wisconsin, South Dakota, and Ohio, a uniform potato variety trial was grown at Grand Forks, North Dakota. The results from this trial are being reported cooperatively by the North Central States.

Potato Crossing Program

During the spring of 1953, 258 controlled crosses and 18 self-pollinations were made in the greenhouse. Most of the varieties and selections used as parents had a high degree of resistance to one or more diseases, particularly scab, late blight, virus X, and virus Y. The principal horticultural characters sought in crosses were quality, tuber type, high yield, early maturity, both red and white skin color, freedom from growth defects, and resistance to bruising.

By using a girdling method, it has been possible to obtain seed balls containing viable seeds of Russet Burbank when crossed with other varieties. In 1953, 4 successful crosses were made with Russet Burbank as the female parent. In 1 cross, Russet Burbank x ND457-1, approximately 1,500 seeds were obtained.

Pollen Viability

Because of the erratic results obtained when certain varieties and selections are used as pollen parents, it was decided to make a systematic study of

Schultz table 3. Total yield in bushels per acre, percentage U.S. No. 1, and specific gravity of 10 named and 18 unnamed red potato varieties grown at Grand Forks, 1953.

Variety	Yield per acre		Specific ^{1/} Gravity
	Total	U.S. No. 1	
	Bu.	Pct.	
ND888-8-1R	475	97	1.065
ND2531-1R	462	96	1.074
Redburt	418	97	1.075
ND2200-1R	412	95	1.072
LaSoda	410	96	1.072
Satapa	403	94	1.079
Sheridan	385	95	1.078
Redkote	368	96	1.075
ND2026-2R	362	91	1.084
ND2104-3R	359	93	1.072
ND2124-20R	355	94	1.082
ND1733-2R	344	93	1.081
Red Pontiac	342	96	1.072
Picha 45.3-6	338	92	1.074
ND2124-10R	333	94	1.079
ND92.49-2R	313	96	1.073
Dazoc	306	94	1.079
W1301	299	93	1.080
Triumph	293	97	1.072
Progress	279	91	1.078
ND2569-4R	279	95	1.076
ND2026-1R	279	92	1.075
ND475M2	268	92	1.084
ND2124-2R	238	95	1.075
Neb 89.46-2	238	92	1.074
Red Warba	235	90	1.079
ND2124-16R	222	94	1.077
ND2531-2R	215	86	1.074
Average	330	94	1.076
L.S.D. at 5%	87		.0040
" " 1%	116		.0055

^{1/} Specific gravity was determined by the use of the National Potato Chip Institute potato hydrometer, using an 8-pound sample from each of 2 replications.

pollen viability as measured by the stainability of pollen grains when treated with a suitable solution of acetocarmine. There was a close relationship between the stainability of pollen grains and the amount of seed obtained when pollen of the same variety was used in the crosses. It was found that varieties with 50 percent and above stainable pollen produced excellent seed set; 30 to 50 percent stainable pollen, fairly low seed set; and less than 30 percent stainable pollen, very low to no seed set. The information obtained was helpful when planning and making crosses. The results in terms of stainable pollen for varieties and selections are reported in Schultz table 4.

Greenhouse and Field Seedlings

Approximately 25,800 seedlings from controlled crosses were grown in the greenhouse in 1953. These were transplanted to benches during August and September and harvested in November and December.

Under isolation 22,464 first-year seedlings were grown in the field at the Langdon Experiment Station. From these 1,020 clones were selected at harvest in October and after further testing and evaluation this number was reduced to 625.

Schultz table 4. Summary of potato pollen viability as determined by the acetocarmine staining method. (Varieties arranged by percentage viability)

Variety or selection	Stainable	Samples
	Pct.	No.
I811-1	92	1
B1290-2	90	1
B922-3	86	5
MD92.49-2L	85	10
ND2098-1	80	5
ND2231-2	79	5
B927.3	78	5
ND457-1	78	5
ND19100-3	78	2
Mich R77-29	78	5
ND2387-1	78	5
Cherokee	78	5
ND475-M2	76	5
ND2780-6R	73	5
ND2018-3R	72	5
B 2368-4R	72	10
W 1301	70	1
NDB3074-2	70	1
ND1255-1	69	5
Minn 113-8	69	1
Redkote	68	5

Schultz table 4 continued

Variety or selection	Stainable	Samples
	Pct.	No.
NDB3074-3	68	1
CS6316	65	5
ND2104-3R	64	5
S 108	64	5
ND457-1-10	64	5
NE2124-10R	64	5
B313N ₁	64	5
Manota	63	5
ND457-1-4	61	5
Minn 32-80	61	4
Neb 49.40-1	60	5
Minn 147-90	60	5
ND2470-3	60	5
ND2855-2	59	10
Neb 26.44-1	59	5
Minn 147-24	56	5
B874-24R	52	1
B2102-11R	49	5
Kennebec	48	5
B 515-2	47	5
N2368-10R	47	5
Triumph	44	5
B 2872-1R	42	5
ND2531-1RR	42	2
I8168-26	41	5
B3131N ₃	38	5
B3132N ₁	37	5
B799-1	36	5
ND2226-2	33	5
ND2910-1R	32	5
I972-1R	30	5
ND2839-2	28	5
I8168-28	27	5
ND2746-2	26	5
ND2569-4R	24	5
B2331-5R	19	3
ND2090-2	16	2
ND457-1-22	12	5
ND457-1-30	11	5
B41956	10	5
Minn 15.46-2-48	3	5
Neb. 209.43-1	3	5
Neb. 213.43-2	2	1
ND2080-2	1	5
ND457-1-36	0	1

Advanced Selections

Advanced selections were grown under isolation from virus diseases at Langdon and with variable field exposure to various diseases at Grand Forks. A summary of seedlings and advanced selections grown and those saved for further testing follow:

<u>Age of clones</u>	<u>No. grown</u>	<u>No. selected</u>
1st year seedlings	22,464	1,020
2nd year selection	725	154
3rd year selections	85	17
4th year and older	43	19

Manota, a new variety, has been increased and X-virus-free seed is available for distribution to certified seed growers in 1954.

Tests for Disease Resistance

Since the discovery of excellent field resistance to Y virus in the selection ND457-1, attempts have been made to transmit this resistance to seedlings of the above selections and to develop methods for testing resistance of seedlings to this virus disease. As soon as it was found that some self-pollinated seedlings of ND457-1 carried resistance to Y virus, similar to that found in the parent variety, a greenhouse experiment was set up to test the possibility of infecting seedling populations with Y virus transmitted by aphids (Myzus persicae). Second size seedling tubers from seedling families having ND457-1 as one parent were planted in the greenhouse during the summer of 1953. Seedling tubers were spaced approximately 8 inches by 8 inches in the bed. Alternate rows of Y-carrying ND530 and field-resistant ND457-1 were included in the planting. After the seedlings and ND530 had emerged viruliferous aphids were put on all plants. These aphids had been feeding on Y-carrying ND530 plants for 48 hours before being placed on the seedling plants. The aphids apparently transmitted the virus to susceptible plants quite rapidly as 20 days later symptoms of Y virus were showing on many of the susceptible seedlings.

This experiment was terminated 55 days after inoculation when all susceptible seedlings were rogued out. A total of 9.6 percent of all seedlings were found to be free of symptoms. Current-season symptoms on the foliage were expressed in the form of severe necrosis to slight mottling of the leaves. Tubers from those plants that showed no symptoms were harvested and presently one tuber from each plant is being grown in the greenhouse for further testing.

The greenhouse test for resistance to Y virus was much more severe than would be encountered under field conditions due to the large build-up of aphids.

In another test for Y virus, it was found that some of the best selfed seedling lines of ND457-1 apparently carry the same type of resistance as does the parent variety.

Late-blight inoculations of seedling families and advanced clones bred for late-blight resistance were again made. Inoculations of seedling families and advanced clones bred for immunity to virus X were again made with a virulent strain of ringspot virus X. This work in testing for disease resistance is being done in cooperation with Dr. W. G. Hoyman, Department of Plant Pathology, and is reported by him.

OHIO

J. P. Slesman

The 1953 season in Ohio was unfavorable for the growth of potatoes. Deficiency in precipitation for the year was 11.97 inches; for April through September, 6.16 inches. Yields were relatively low and a large percentage of the tubers were undersize. On the other hand, conditions were favorable for the development of the potato leafhopper. Populations of this insect generally were high, and all tuberosum selections under observation showed an appreciable amount of hopperburn.

Approximately 2200 first-year seedlings, received from Dr. Stevenson, representing 12 progenies, were grown at Wooster. Leafhopper populations were high in this planting, and very few of the seedlings escaped injury as recorded in Ohio table 1. Those seedlings that showed the least amount of hopperburn were a disappointment at harvesttime because either they did not produce tubers or the tubers were rough and ill-shaped. Most of the seedlings that showed an appreciable resistance to the potato leafhopper developed large vines and were late in maturing. About 50 seedlings were selected for planting in 1954.

Three thousand first-year seedlings provided by Dr. C. E. Peterson were planted at Celeryville in muck soil. Leafhoppers, flea beetles, and leaf blights were of little importance in this planting, and selections were based entirely upon yield and tuber appearance. Approximately 100 of the seedlings were saved for planting in 1954.

One hundred fifty seedlings selected from 1952 first-year progenies were planted in 10-hill plots at Wooster. Of these 45 were considered worthy of further trial.

Solanum Species

The search for a source of insect resistance was extended to the wild Solanum species with the assistance of Dr. Hougas. During the past 4 years it has been established that polyadenium is immune to leafhopper attack (zero population); that chacoense and commersonii are highly resistant (less than 2 nymphs per 100 leaves); and that caldasii and certain accessions of schickii, boergerii, and gibberulosum are resistant (10 nymphs per 100 leaves). Susceptible species showed leafhopper populations as follows: leptostigma 400, stoloniferum 300, and verrucosum 150 nymphs per 100 leaves. Polyadenium, stoloniferum, garciae, bulbocastanum and several accessions of schickii and parodii were highly resistant to the potato flea beetle. Stoloniferum 161138 and demissum 161168 were resistant to aphid attack.

A number of interspecific crosses was obtained as tubers or as seed from the Sturgeon Bay Station through the courtesy of Dr. Hougas. Chacoense x demissum and Epicure x chacoense hybrids were resistant to the potato leafhopper but the plants were growing luxuriantly on October 1 and tuber production was about

one-tenth that of Irish Cobbler. Several of the hybrids (polyadenium x tuberosum) x (demissum x tuberosum) compared favorably with Irish Cobbler in total yield but the set was large and the tubers undersize. All these hybrids were susceptible to leafhopper and flea-beetle attack. Some of them, however, supported a fairly large leafhopper population without suffering an appreciable amount of hopperburn, and the vines were still green on October 1.

Ohio table 1. Reaction of progenies of different crosses to leafhopper injury (Hopperburn) at Wooster, Ohio. 1953.

Pedigree No.	Parentage	Seedlings tested	Seedlings placed in several classes of hopperburn ^{1/}				
			1	2	3	4	5
		No.	Pct.	Pct.	Pct.	Pct.	Pct.
B 3421	Sequoia x B 724-1	323	8	41	38	10	3
B 3432	B 721-35 x Teton	54	0	0	2	44	54
B 3433	B 724-1 x Teton	150	1	19	39	20	21
B 3440	B 478-1 x B 355-44	314	2	11	35	25	27
B 3441	B 478-1 x B 606-67	154	0	3	25	26	46
B 3449	Robusta x Earlane	37	2	8	30	30	30
B 3450	(Flava x Robusta)x Menominee	54	0	10	38	35	17
B 3451	" x Teton	47	0	11	30	30	34
B 3471	Chippewa x Katahdin	37	0	8	19	35	38
B 3476	B 721-29 x Furore	136	0	5	37	32	26
B 3477	B 766-45 x "	95	0	5	28	20	47
B 3478	B 721-30 x Teton	280	1	24	19	16	40
B 1385	B 859-10 Selfed	320	0	23	44	16	17
B 1395	B 724-1 "	18	0	0	0	0	100

1/ Classes of hopperburn (leaf area injured):

1 = 0 to 10%
 2 = 11 to 25%
 3 = 26 to 50%

4 = 51 to 75%
 5 = 76 to 100%

PENNSYLVANIA
J. Stanley Cobb

The yields and percentages of dry matter of 36 varieties of potatoes tested at the Pennsylvania State University Agricultural Experiment Station, in 1953, are given in Pa. table 1.

Pa. table 1. Potato variety test at the Pennsylvania State University, Agricultural Experiment Station, 1953.

Variety	Yield per acre	Vines dead 9/23/53	Dry matter
	Bu.	Pct.	Pct.
Cobbler	243	100	19.3
Bliss	152	98	16.9
Rose	275	50	18.5
Early Ohio	220	100	17.8
Keswick	222	90	18.2
Cherokee	295	50	18.9
Katahdin (Me.)	264	10	16.5
Ontario	309	0	17.3
Kennebec (N.Y.)	399	0	17.6
Canso (ca.)	283	30	16.7
Katahdin (Potter)	258	10	16.7
B 606-67	320	10	18.2
Green Mountain	266	50	18.3
B 515-2	254	98	17.4
Teton	393	10	16.2
B 2368-4	390	5	19.1
B 351-44	318	5	17.6
Mohawk	320	5	18.2
B 2368-11	301	10	15.8
Katahdin (U.S.D.A.)	293	10	16.5
Canus	291	50	17.9
New White	274	90	17.2
Canogo	281	0	17.6
Russet	269	0	17.9
Canso (Potter)	218	30	16.9
Red McClure	299	0	16.7
Placid	280	50	18.6
Manota	291	90	18.2
Essex	316	0	15.9
Red Pontiac	362	5	15.9
Pontiac (N.Y.)	263	5	16.5
Pontiac (U.S.D.A.)	268	10	15.7
Kennebec(U.S.D.A.)	306	5	17.9
Pungo (U.S.D.A.)	244	50	19.2
Ole Bull	291	30	15.7
Houma	246	50	17.6

The yield data in most cases are the average of 4 replications. In preparing the plots a red clover sod and 10 tons of manure per acre were plowed down and 1,500 pounds per acre of 5-10-10 fertilizer was applied in bands at planting time, June 5.

Hot weather at planting time resulted in a poor stand, and dry hot weather at the end of the growing season caused the vines to die prematurely. Low yields resulted from these adverse weather conditions. However, in spite of these conditions, Kennebec (N.Y.), Teton, and B 2368-4 yielded almost 400 bushels per acre.

Uniform Tests of Varieties

Sixteen varieties were tested in uniform demonstration plots in the counties of Lehigh, Schuylkill, Somerset, York and Potter. The one in Potter County was drowned out, but the yield data for the other 4 are given in Pa. table 2, and the percentages of dry matter for each of the 16 varieties are given in Pa. table 3.

The information presented in these tables was prepared by Agronomy Extension, Agricultural Economics Extension, Entomology Extension, and Plant Pathology Extension, in cooperation with the Experiment station staffs of Agronomy and Botany. The highest yielding varieties in these tests were Red Pontiac and Canoga. Houma, Cherokee, Keswick, Red McClure, and White Rural ranged in percentage of dry matter from 19.7 to 19.0

Pa. table 2. Results of 1953 uniform potato variety demonstrations yield per acre of 16 varieties tested in 4 counties in Pa.

Variety	Counties and yield per acre											
	Lehigh Co.			Schuylkill Co.			Somerset Co.			York Co.		
	Total	U.S.No.1	Total	U.S.No.1	Total	U.S.No.1	Total	U.S.No.1	Total	U.S.No.1	Total	U.S.No.1
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Pct.	Bu.
<u>Early</u>												
New White	462	360	303	236	478	382	377	258	405	76		309
Irish Cobbler	446	406	284	190	438	289	406	341	394	78		307
3CK-3 (seedling) (a) (c)	178	77	104	38	194	50	119	51	149	38		56
<u>Medium Season</u>												
Red Pontiac	499	399	408	306	654	464	452	380	503	77		387
Katahdin	402	370	250	213	445	400	369	321	367	89		326
Canus	376	316	281	244	422	363	357	303	359	86		307
Keswick (a)	413	330	333	246	451	289	384	326	395	75		298
Kennebec (a) (c)	406	317	306	254	464	353	338	264	379	78		297
Ole Bull	411	345	253	182	475	280	391	305	383	73		278
Cherokee (a) (b)	333	306	255	194	389	327	338	280	329	84		277
Houma	381	267	279	179	419	310	369	299	362	73		264
3LW-12 (seedling) (a) (c)	318	258	191	132	315	227	218	144	261	73		190
<u>Late</u>												
Canoga	472	411	343	281	630	472	422	363	467	82		382
Red McClure	429	245	355	202	630	416	311	134	431	58		249
White Rural	337	182	262	126	432	302	308	222	335	62		208
Russet Rural (c)	237	171	216	115	354	301	216	126	256	70		178

(a) Resistant to the common race of blight but susceptible to a new race that is becoming widespread. Should be sprayed the same as a blight-susceptible variety.

(b) Scab-resistant.

(c) Seed of these varieties were badly infected with spindle tuber.

Pa. table 3. Percentage dry matter in the tubers of 16 varieties of potatoes grown in 4 counties of Pennsylvania in 1953.

Variety	Clearfield Co. Dry matter	Lehigh Co. Dry matter	Schuylkill Co. Dry matter	Somerset Co. Dry matter	York Co. Dry matter	Ave. Dry matter
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Houma	18.7	19.2	21.4	19.9	19.4	19.7
Cherokee	19.9	18.7	20.7	19.7	18.7	19.5
Keswick	19.7	18.4	18.4	20.9	18.9	19.3
Red McClure	19.2	19.4	19.9	17.9	19.4	19.2
White Rural	--	19.9	19.4	17.9	18.7	19.0
Irish Cobbler	19.7	17.9	19.2	19.7	18.2	18.9
Canoga	19.9	18.4	17.7	17.7	19.9	18.7
Russet Rural	17.9	19.7	19.2	18.2	18.4	18.7
New White	18.7	18.2	17.9	19.9	18.2	18.6
Kennebec	18.9	19.7	17.9	18.4	17.4	18.5
Katahdin	17.9	18.9	18.7	18.2	17.9	18.3
Canus	--	17.4	17.9	18.2	17.2	17.7
Ole Bull	15.5	18.7	19.4	17.7	17.4	17.7
3CK-3	--	16.2	17.4	18.4	17.7	17.4
Red Pontiac	17.2	16.7	17.4	16.7	15.7	16.8
3LW-12	--	16.0	16.9	17.2	15.7	16.5

PENNSYLVANIA
R. E. Hartman

This year's test of wart immunity of 23 seedlings and named varieties of the U.S.D.A. was made in heavily infested soil at Bernice, Sullivan County, Pa. The area has an altitude of 2,000 feet with a cool, moist climate.

The season was unusual; there was no measurable rainfall from June 1 to September 1 when all plants were dead. Thus, the soils were too dry to permit wart development. The drought caused severe early yellowing with 50 percent of leaf surface yellowed by August and all vines dead September 1, 1953.

Summary of Wart Reaction: Of the 23 seedlings and named varieties tested, none showed infection. Of the 23 checks, 10-row hills of susceptible Russets, none was infected.

The season's experiment with wart susceptibility of the U.S. Department of Agriculture seedlings and newly named varieties was unsuccessful due to a complete absence of rainfall through the growing season. If it is at all possible, all these seedlings and varieties, if available, will be planted this coming season. We have space in our experimental plot for a total of 30 seedlings or varieties, so a few additional seedlings or varieties could be handled in our 1954 project.

RHODE ISLAND
J. E. Sheehan

At Kingston, R. I., during 1953 19 potato varieties and 1 seedling selection were grown for observation and yield. All 20 selections were obtained from the U.S.D.A. Station at Presque Isle, Maine.

The 1953 growing season for potatoes in Rhode Island was considered favorable for medium to late-maturing varieties. R.I. table 1 gives the rainfall and average temperatures for the 1953 season as compared with the normal. The precipitation for June was 2.99 inches below the normal which probably accounts in part for the poor showing of some of the early maturing varieties.

Rhode Island table 1. Rainfall and temperature for the 1953 growing season.

	April	May	June	July	August	September
	In.	In.	In.	In.	In.	In.
	<u>Rainfall</u>					
Normal	4.63	3.86	3.46	3.34	4.30	3.90
Actual	6.39	4.27	.47	6.24	5.10	2.49
Departure	+1.76	+ .41	-2.99	+2.90	+ .80	-1.41
	<u>Temperature °F</u>					
Normal	44.5	55.0	63.6	69.2	59.9	61.9
Actual	46.3	57.2	65.0	71.8	68.6	62.9
Departure	+1.8	+2.2	+1.4	+2.6	+8.7	+1.0

Granular cyanamid at the rate of 300 pounds per acre was broadcast before plowing. An 8-12-12-2 fertilizer at 2,000 pounds per acre was applied in bands at planting time. The test area was in Sudan grass the previous year and alfalfa prior to that. The soil is classed as a very fine sandy loam.

Yields were calculated from 32-foot rows, replicated 4 times. Seedpieces were spaced 1 foot apart in the row, with 3 feet between rows. The potatoes were planted on April 27 and harvested October 9. All vines were dead on or before September 24 when a killing frost occurred. A portion of the data obtained is given in R. I. table 2. Ontario was the highest yielding selection but was not significantly higher than B 606-67, Sebago, Menominee, Chippewa, Teton, or Green Mountain.

There was no early blight reported on Katahdin, Sebago, Mohawk, Ontario, Menominee, Pungo and B 606-67. None of the other varieties had more than a trace except Pungo which had 2 percent infection. Late blight was of no consequence on any of the varieties. Three varieties showed leaf roll:

R. I. table 2. Yield and other data on 20 potato varieties grown at Kingston, R. I., 1953

Variety	Yield per acre		Dry matter	Days to maturity	Tuber		
	U.S. No. 1				Size	Shape	
	Bu.	Pct.	Pct.	No.			
Ontario	630	93.1	15.5	150	Medium	Smooth	Regular
B 606-67	619	97.5	16.2	123	Large	"	"
Sebago	602	97.9	14.6	150	Medium	"	"
Menominee	596	97.1	15.5	150	"	Rough	Irregular
Chippewa	546	97.9	15.0	124	Large	Smooth	Regular
Teton	528	97.7	14.1	146	"	"	"
Gr. Mountain	514	97.1	17.4	150	Medium	Medium	Irregular
Sequoia	504	95.3	14.1	144	Large	Smooth	Regular
Katahdin	504	98.1	15.7	141	"	"	"
Mohawk	500	98.0	15.3	150	Medium	"	"
Pontiac	499	96.1	13.9	128	Large	Medium	"
Pungo	461	96.9	15.3	129	"	Smooth	"
Erie	457	94.8	15.1	150	Medium	"	"
Kennebec	444	97.7	14.6	130	Large	"	"
Russet Rural	416	95.5	16.2	150	"	Medium	"
Cherokee	401	92.2	15.2	123	Medium	Smooth	"
Keswick	366	98.0	17.9	122	"	"	Irregular
Canso	317	92.9	14.6	132	"	Rough	Regular
Warba	287	92.2	15.1	131	"	"	Irregular
I. Cobbler	274	94.5	15.6	115	"	Smooth	Regular

Teton 2 percent, Katahdin 5 percent, and Sebago 10 percent. Mohawk had 5 percent fusarium wilt and Pontiac 1 percent mosaic.

Aphids were present in small numbers on all varieties except Pungo which was heavily infested. Flea-beetle infestation was light to moderate on all varieties except Erie, Russet Rural, and Kennebec which had only traces. Pontiac, Menominee and Pungo were slightly damaged by Japanese beetles. Teton, Erie, and Warba had small amounts of leafhopper injury.

A weekly spray schedule was followed using liquid parzate and 50% wettable DDT. DDT alone was used for the first 3 sprays. The first spray was applied June 5 and the last on September 9.

SOUTH CAROLINA
William M. Epps

The 1953 season in South Carolina was such that little information could be obtained on the potato varieties in the test plots. Excessive rains following planting ruined the stand. The extent of stand loss varied from a complete loss in low parts of the field to a very slight loss in the higher parts. After April 1 rainfall was so inadequate that the potatoes grew poorly. Yields were low, and the potatoes were rough and mis-shapen. No effort was made to take yield records because of the poor stands. The best plots in each variety were selected for observational data. Varieties varied markedly in their ability to produce a stand under the adverse conditions. These differences were so distinct that the average stands were recorded and are presented in S. C. tables 1 and 2. Duplicate or triplicate samples were used in measuring specific gravity. Specific gravities are also included in S. C. tables 1 and 2.

S. C. table 1. Performance of Potato Varieties and Seedlings at Charleston, S. C., 1953.

Variety	Seed source	Stand	Specific gravity ¹	Total solids	Maturity	Remarks
		Pct.		Pct.		
Cobbler	PEI	84	1.079	19.4	Early	Small, rough, deep eyes.
Pontiac	"	74	1.068	17.0	Mid-early	Color pale, size good.
Sebago	"	65	1.075	18.6	Late	Oval, wh., very smooth, good size.
Bliss	"	50	1.070	17.5	Early	Med. red, size good.
Katahdin	"	64	1.075	18.6	Mid-late	Round, wh., irregular, small.
Bliss	ND	66	1.066	16.7	Early	Med. red, size good.
Pontiac	"	91	1.069	17.3	Midseason	Pale red, size good.
Kennebec	Maine	76	1.076	18.8	Late	Oval, wh., smooth regular, good size.
Pungo	"	91	1.083	20.2	Mid-early	Rough, round-oval, deep eyes, good size.
Cherokee	"	69	1.078	19.2	"	Wh., irregular shape, med. eyes, med. size.
B 73-10	"	72	1.078	19.2	Midseason	Oval russet skin, smooth, med. size.
B 355-35	"	73	1.072	18.0	Late	Oval, flat wh., smooth shallow eyes, good size.
Early Gem	"	63	1.068	17.0	Midseason	Russet skin, irreg. oval shape.
B 447-98	"	58	1.078	19.2	Early	Slight russet, small size, rough-irregular shape.
B 606-67	"	78	1.080	19.7	Mid-late	Round flat white, shallow eyes, semi-rough, 50% sprouted at harvest.
B 606-103	"	58	1.077	19.1	Midseason	White, smooth, med. eyes, round to oval. Sized up well.

¹/ Average of samples from three plots.

S. C. table 2. Performance of Nebraska, Tennessee, and Minnesota, Potatoes at Charleston, 1953.

Variety	Seed source	Stand	Specific gravity <u>1</u>	Total solids	Maturity	Remarks
		Pct.		Pct.		
Osage (CS6316)	Minn.	86	1.082	20.1	Mid-late	White, oval, med. shallow eyes 2/ Somewhat bean-shaped (S)-
1859 <u>1</u> /	Tenn.	91	---	--	Midseason	Samples lost
2109	"	53	1.092	22.2	Mid-late	Oval, wh. slightly russet, smooth medium shallow eyes, fair size (S)
2349	"	64	1.078	19.2	Midseason	Oval, wh., shallow eyes, rough shape in dry soil. (D)
2396	"	50	1.087	21.2	Early	Wh., smooth, oval, slightly russet. Yield very low. (S)
45-12-3	Minn.	73	1.072	18.0	Midseason	Long, wh., 50% sprouted at harvest. (D)
3044 <u>1</u> /	Tenn.	71	--	--	Mid-early	100% mosaic in field. (D)
3266	"	30	1.069	17.3	"	Wh., oval-round, shallow eyes, small size. (D)
3600	"	59	1.076	18.9	Early	Wh., oval, shallow eyes, too rough. (D)
3606	"	65	1.076	18.9	Mid-early	Wh., round-oval, very smooth, size good. (S)
3674	"	95	1.071	17.7	"	Long-oval, wh., smooth shallow eyes, size good. (S)
3708	"	64	1.078	19.2	Midseason	Oval-round, slightly russet, very flat. (D)
3730	"	50	1.080	19.7	"	Long, wh., shallow to swollen eyes. Very weak vine, semi-prostrate. (D)
Katahdin	PEI	90	1.078	19.2	"	
Cobbler	"	71	1.079	19.4	Early	Check Varieties
Sebago	"	56	1.077	19.1	Late	
89.46-2	Neb.	55	1.076	18.8	Mid-late	Bright red, oval-long, too rough, weak, semi-erect vine. (D)
127.46-1	"	72	1.069	17.3	Midseason	Large vigorous plant, pale red oval tubers, med. size, yield good. (S)
26.44-1	"	67	1.081	19.9	"	Bright red, round-oval, med. eyes, good yield. Vigorous bushy plant, purple flower. (S)
120.40-6	"	31	1.076	18.9	Late	Clean white but rough tubers, poor yield. Erect weak plant. (D) 2/
213.43-2	"	87	1.073	18.2	Early	Bright red, rough tubers. Drought-susceptible like Bliss. (D)
213.43-3	"	47	1.075	18.6	"	Oval-round, med. eyes. Like 213.43-2 but tuber smoother. (S)
White Cloud	"	88	1.083	20.2	Midseason	Vigorous plant, round clean wh. tubers, med. eyes, sunscalds very badly. (D)
Sebago	PEI	56	1.073	18.2	Late	Check variety

1/ Average of two samples. 2/ (S) = Save (D) = Discard

Exposure tests were conducted with the most promising of the white varieties except where there were not enough tubers to conduct such tests. The potatoes were artificially skinned by rubbing them together in the bags, then spread out on the ground in full sunlight. Samples were collected after 30, 50, and 70 minutes exposure. These samples were stored for 48 hours in a shed in bags. They were then graded and the percentages of various grade defects caused by the exposure were determined. Results are shown in S. C. table 3.

S. C. table 3. Exposure test results on potato varieties and seedlings in South Carolina. (Expressed as percent of tubers in each class).

Variety	50-Minute Exposure 1/					
	Soft rot	Sticky scald	Scald	Total unsalable	Brown	Healthy
B 447-98 (14)	-	-	2.9	2.9	2.2	94.9
B 605-10 (16)	1.4	-	3.5	4.9	2.1	93.0
Cherokee (10)	-	-	2.0	2.0	11.2	86.8
B 355-35 (12)	-	-	9.9	9.9	25.8	64.3
Sebago (3)	-	-	5.3	5.3	21.3	73.4
Cobbler (1)	-	1.3	20.4	21.7	7.9	70.4
Katahdin (5)	-	-	20.8	20.8	31.8	47.4
B 515-2 (13)	1.5	10.6	31.8	43.9	14.4	41.7
Kennebec (8)	--	1.3	34.0	35.3	34.0	30.7
Wh. Cloud (47)	1.4	-	37.2	38.6	29.0	32.4

70-Minute Exposure 1/

B 447-98 (14)	--	--	0.7	0.7	5.0	94.3
B 605-10 (16)	1.2	0.6	-	1.8	10.7	87.5
Cherokee (10)	6.8	.8	7.5	15.1	4.5	80.4
B 355-35 (12)	--	2.1	10.3	12.4	27.4	60.2
Sebago (3)	--	1.4	13.7	15.1	13.7	71.2
Cobbler (1)	--	--	30.7	30.7	1.5	67.8
Katahdin (5)	--	--	37.9	37.9	13.1	49.0
B 515-2 (13)	--	7.6	29.7	37.3	24.1	38.6
Kennebec (8)	.6	.6	62.8	64.0	10.3	25.6
Wh. Cloud (47)	--	4.3	67.1	71.4	4.3	24.2

1/ Conditions at time of exposure: Clouds, none; temperature, 93-94° F., relative humidity, 44-42%; wind, 10 mph; time 10:00-11:20 a.m.

The exposure test divided the varieties into two clear-cut groups. The first group of five varieties which did not scald severely included Cherokee and Sebago and seedlings B 447-98, B 605-10, and B 355-35. The severely scalded group included Cobbler, Katahdin, Kennebec, White Cloud, and B 515-2. Some difference was evident in the degree of skinning of the various varieties, but the differences in scald susceptibility were not correlated with the amount of skinned surface.

Two of the six Maine seedlings, B 355-35 and B 606-103 appeared worthy of further test. Both produced fair yields of medium-sized, smooth, white potatoes in spite of the drought. The other seedlings were discarded for reasons as follows: B 606-67 showed about 50 percent sprouted tubers at harvest; B 447-98 produced a heavy set of rough russeted tubers that failed to reach marketable size; B 515-2 was only of fair appearance and scalded badly when exposed to the sun; B 73-10 has been tested for many years and discarded because of its poor appearance, especially when grown under adverse weather conditions.

White Cloud, planted for the first time in South Carolina, produced an excellent stand and a good yield. The freshly harvested tubers were clean, white, medium-shallow-eyed, and attractive in general appearance. It was planted 12 days later than the other varieties in the exposure test and was possibly slightly less mature but scalded so badly that further tests with this variety do not appear warranted.

The two red-skin seedlings from Nebraska, 26.44-1 and 213.43-3, looked good. The skin color was much brighter than that of Bliss Triumph, and the shape and general appearance was at least as good as that of Bliss. Further tests will have to be conducted to determine the characteristics of these bright red seedlings in a more normal crop season.

The extremely high specific gravity of the Tennessee seedling, 2109, was of interest (duplicate samples 1.0904 and 1.0942). The poor stand and growth of this seedling made it impossible to obtain satisfactory information on its other characteristics.

SOUTH DAKOTA
Allyn Cook

Randomized yield trials of 4 replications, with single-row plots 50 feet long, were conducted at 3 locations in South Dakota in 1953. At Redfield there were 2 trials, 1 irrigated and 1 dry land. At Garden City and Brookings there were only dry-land plots. Results of these plots, planted with seed from the same lots, are presented in S. Dak. table 1.

South Dakota table 1. Variety yields in South Dakota, 1953.

Variety	Location and yield per acre				Total solids (Brookings) Pct.
	Brookings Dry land Bu.	Garden City Dry land Bu.	Redfield Dry land Bu.	Redfield Irrigated Bu.	
Bliss Triumph	430	100	140	236	17.7
Canso	369	139	230	348	21.7
Cherokee	469	157	286	331	20.9
Chippewa	453	175	246	407	19.2
Irish Cobbler	383	173	282	345	18.2
Osage	320	101	115	204	18.4
Columbia Russet	387	172	260	391	24.0
Early Ohio	283	142	226	358	16.9
Katahdin		109	222	339	
Kennebec	233	197	307	423	14.8
Keswick	456	144	235	277	20.2
LaSoda	495	162	280	445	17.2
Red Pontiac	468	163	215	314	15.5
Russet Sebago	299	139	211	302	17.9
Sebago	376	154	267	360	19.0
Waseca	420	128	189	244	16.2
White Cloud	234	82	108	122	18.7
Yampa		134	192	318	
Stark's Red	272	67	95	208	17.2
L.S.D. 5%	78	30	74	152	
" 1%	104	41	97	203	

At Brookings 16 advanced lines from Louisiana were randomized in 4 replicated blocks with plots 25 feet long. Of these 8 entries yielded over 350 bushels per acre, with LD 81-64, LD 81-99, LD 82-269, LD 92-105, and LD 92-216 giving the best overall performance. (S. Dak. table 2)

Also at Brookings, 15-hill rows of some 160 lines were planted in soil heavily infested with scab. Of this group, all but 19 were discarded either for susceptibility to scab or other undesirable qualities. The selected lines, listed in table 3, will again be grown in 1954.

South Dakota table 2. Louisiana breeding line performance at Brookings, 1953.

Line	Yield per acre	Total solids
	Bu.	Pct.
LD 81-64	447	18.4
LD 81-88	264	15.5
LD 81-99	451	18.2
LD 81-99	458	18.9
LD 81-113	416	17.9
LD 81-115	338	19.4
LD 82-94	335	20.2
LD 82-265	305	16.5
LD 82-269	346	20.5
LD 83-274	197	19.2
LD 91-78	341	18.4
LD 91-88	402	16.9
LD 91-143	337	21.4
LD 91-232	353	21.9
LD 92-105	353	19.9
LD 92-216	394	20.7
LaSoda	495	17.2
L.S.D. 5%	91	
" 1%	122	

South Dakota table 3. Lines selected in 1953 at Brookings for further trial.

650	B 2369ND1	I8116-1
3044	B 2392ND1	I8168-26
B 926-9	I44-16-1	I8168-30
20.44-2	I811-1	I8169-8
213.43-3	I872-4	ND2226-2
B 2336ND1	I961-1	LD12-53
		LD92-23

A randomized experiment of split-plot design with 4 replications on the W. J. Hartman farm at Garden City, S. Dak., was designed to compare the influence of nitrogen side dressing applied at early midseason with fertilizer broadcast prior to planting. The highest significant yield was obtained with broadcast application of 390 pounds per acre prior to planting followed by a 120 pound per acre side dressing of nitrogen about 6 weeks after planting. (S. Dak. table 4)

Common scab is one of the more important diseases in South Dakota and can be at times a limiting factor in potato production. On the Ed H. Lacey farm near Trent, S. Dak., a replicated experiment was designed to determine the influence of various broadcast applications of sulfur on the incidence of scab. The soil, a Cass loam, is quite acceptable for potato production but in 1952 only half of the crop was salable because of scab. While improvements in the method of application will probably give greater beneficial effect, it can be noted from S. Dak. table 5 that a reduction of scab and increase in total salable tubers was obtained in 1953.

South Dakota table 4. Effect of various fertilizers and method of application on total yield of Bliss Triumph potatoes at Garden City, 1953.

Treatment	Fertilizer broadcast ^{1/}	Applied side ^{2/} dressing	Yield per acre
No.			Bu.
1	0-0-0	None	268.3
2	0-0-0	120-0-0	273.0
3	180-0-0	None	289.9
4	180-0-0	120-0-0	268.3
5	0-110-0	None	296.4
6	0-110-0	120-0-0	291.5
7	180-110-0	None	307.8
8	180-110-0	120-0-0	296.8
9	180-110-110	None	310.4
10	180-110-110	120-0-0	343.2
L.S.D. 5%			37.5
" 1%			50.7

^{1/} Fertilizer broadcast by hand April 5, 1953.

^{2/} Side dressing applied by hand July 3, 1953.

South Dakota table 5. Effect of broadcast sulfur as a control of scab at Trent, 1953.

Sulfur per acre	Tubers exhibiting ^{1/}				Salable tubers ^{1/}
	No scab	Surface scab	Raised Lesions	Pitted lesions	
Lb.	No.	No.	No.	No.	No.
0	35	7	1	86	69
600	41	7	1	80	76
1,200	57	18	0	54	89
1,800	61	11	1	54	89
2,400	49	31	0	47	92
3,000	63	6	0	49	96

^{1/} Total from five 25-tuber samples.

TENNESSEE (Crossville)

T. R. Gilmore

In 1953 potatoes suffered from drought during part of the growing season but in spite of the conditions fairly satisfactory yields were obtained. Three named varieties and 16 numbered varieties were tested for yield. The data for these tests are given in Tenn. table 1.

Tenn. table 1. Yield test at Crossville, Tenn. 3 replications of 25 hills.

Seedlings or varieties	Parentage	Yield	
		Total	U.S. No.1
		Bu.	Bu.
Kennebec	B 125 x (X96-56)	282	262
Cherokee	(X96-56) x (X528-170)	258	170
Pungo	(X96-44) x (X528-170)	256	202
T.L. 2817	Empire x B 61-3	250	202
T.L. 3769	Kennebec x B 522-33	247	205
T.L. 2827	Empire x B 61-3	235	190
T.L. 3600	B 608 x B 594-46	227	91
T.L. 3954	B 76-23 x 157-9	223	165
T.L. 2349	B 56-1 x B 76-23	219	160
T. 73-10	Mohawk x (X96-56)	210	170
T.L. 3865	1910 B 182 T	210	130
T.L. 4396 (B 2918-5)	B 607-37 x B 607-56	212	157
T.L. 4064	B 607-37 x B 607-56	190	127
T.L. 2473	B 381-2 x 96-56	189	159
T.L. 4467 (B3007-4)	B 66-1 x B 778-43	149	128
T.L. 3266 (B922-3)	TI5 x B 355-24	169	128
T.L. 3273 (B922-16)	TI5 x B 355-24	142	104
T.L. 3708	B 607 x B 355-24	138	97
T.L. 3597	B 608-56 x B 580-20	125	76

L.S.D. at 5%

58 bushels

TEXAS (Weslaco)
Paul W. Leeper and W. R. Cowley

In 1953 growing conditions in the Rio Grande Valley were not favorable for potatoes because of excessive hot and windy days. Because of a shortage of irrigation water, the plot suffered from lack of moisture at several periods. In order to save the plants it was necessary at one time to irrigate with fairly salty water. This kept the plants alive but that was about all. As a result, the yields were rather low. The yield data for this test are given in Texas table 1.

Texas table 1. Yield plot at Weslaco, Tex. 4 replications of 25 hills.

Seedlings or varieties	Parentage	Total yield
		Bu.
Pungo		140
LaSoda		135
T.L. 1354	Pontiac x 92-36-5	122
" 1859	Pontiac x 96-56	121
" 3972	Pontiac x B 400-1	113
Kennebec		107
T.L. 338		107
B 73-10		107
T.L. 1345	Pontiac x 15.2 selfed	100
Bliss Triumph		98
T.L. 4058	B 381-2 x B 56-1	87
" 2178	1276-185 x (96-56)	86
" 4411 (B2878-4)	B 606-37 x B 56-1	86
" 2349	B 56-1 x B 76-23	85
" B 975	Pontiac x B 400-1	83
" 4442 (B2162-18)	B 381-2 x 528-170	82
" 3978	Pontiac x B 400-1	81
" 3943	B 56-11 x B 400-1	74
" 3976	Pontiac x B 400-1	77
" 2786	B 381-2 x B 56-1	71
" 4001	B 381-2 x B 56-1	69
" 1396	176-26 x 179-26	68
" 4458 (B2368-5)	Pontiac x B 400-1	67
" 3807	B 578-39 x B 446-8	66
" 1404	176-26 x 179-26	64
" 3521	B 381-2 x B 66-1	61
" 3060	B 2216-62	58
" 2396	B 76-23 x 792-94	56
" 2459	B 381-2 x 96-56	55
" 4406 (B778-14)	B 778-14 x B 400-1	53
" 4002	B 381-2 x B 56-1	53
" 2402	B 76-23 x 792-94	53
" 3058 (B 2162-49)	B 381-2 x 528-170	51
" 1393	148-99 x 179-26	50
" 3937	B 56-11 x B 381-2	50
L.S.D. at 5% level		21

VIRGINIA (Blacksburg)

P. H. Massey, Jr.

In 1953, 20 varieties and seedlings were grown and evaluated at the Virginia Agricultural Experiment Station. The experimental procedure and growing conditions were as follows:

Location: Blacksburg, Va.
Soil: Groseclose silt loam
Previous crop: Corn
Plot size: 24 x 3 feet (data taken on center 22 feet of each record row)
Plot design: Randomized block
Replications: 5
Seed: Supplied by Dr. Raymond Buck, Jr. Plant Industry Station,
Beltsville, Md. Cut seed approximately $1\frac{1}{2}$ ozs.
Spacing: 12-inches
Fertilizer: 1,500 pounds of 5-10-5 per acre. One-half broadcast and
harrowed into soil and the remainder applied in bands
at planting time.
Planting date: March 31
Cultivation: Frequently enough to control weeds.
Fungicide: Orthocide 50
Insecticides: Methoxychloro 50 and malathion
Growing conditions: Generally unfavorable because of extremely hot
weather during July and August.

The severe weather considerably reduced the yield of all varieties and seedlings tested. The Russet Rural, White Rose, and Green Mountain varieties exhibited many tuber malformations.

The Kennebec, in general appearance, was far superior to all varieties and seedlings tested. This variety also yielded significantly more No. 1 potatoes than all others except Sequoia. The Pungo did not perform as well this season as it did last year. In 1952, it outyielded all others tested including Kennebec. The numbered seedlings did not perform as well as many of the named varieties.

In conclusion, even though adverse weather conditions were experienced, this season afforded a good opportunity to study the effects of drought and high temperature on the yield and uniformity of the 20 potato lines tested.

Results of these tests are given in Virginia (Massey) table 1.

Virginia (Massey) table 1. Yield per acre, specific gravity, and dry matter of 20 varieties of potatoes tested in 1953.

Variety or seedling	Mean yield per acre			Mean specific gravity	Total solids
	U.S. No. 1	U.S. No. 2	Total		
	Bu.	Bu.	Bu.		Pct.
Kennebec	425	57	482	1.091	22.2
Sequoia	367	101	468	1.085	20.7
Green Mountain	329	94	423	1.095	23.0
Teton	310	54	364	1.083	20.3
White Rose	301	132	433	1.088	21.4
Triumph	288	59	347	1.075	18.5
Russet Rural	256	105	361	1.090	21.8
Mohawk	250	34	284	1.091	22.2
Houma	249	75	324	1.090	21.8
Irish Cobbler	237	47	284	1.088	21.4
Russet Burbank	235	51	286	1.092	22.3
B 606-67	233	65	298	1.084	20.5
B 515-2	210	28	238	1.084	20.5
Marygold	205	28	233	1.093	22.5
Red Warba	190	44	234	1.084	20.5
Pungo	187	33	220	1.091	22.2
Chippewa	182	33	215	1.078	19.4
Cherokee	177	99	276	1.095	23.0
B 75-4	139	21	160	1.095	23.0
B 73-18	83	13	96	1.095	23.0
L.S.D. .05	76	25	87	.013	
" .01	101	34	116	.017	

1/ Specific gravity determination made on 5 replications of 25 tubers each.

VIRGINIA (Norfolk)
R. N. Hofmaster

Varietal Resistance to Insect Injury

During the course of a study on potato varieties and their resistance to scab, comparisons were made between the varieties in regard to flea-beetle, wire-worm, and leafhopper injury.

In the flea-beetle study of the foliage, 5 plants were sampled in each replication. Two lower leaves, 2 middle, and a top one were selected at random from each plant toward the end of the growing season. In the study on tuber injury 20 tubers were taken from each replication and all flea-beetle punctures counted in a 1-square-inch area of each tuber.

Hopperburn injury was recorded by giving a rating of 0 for no injury and a rating of 7-8 for severe injury.

RESULTS

The data for these tests are given in Va. table 2.

The foliage of Menominee and Ontario had the largest degree of resistance to flea-beetle injury; Kennebec, Pungo, and Sebago were next; and Pontiac and Cobbler showed the least. The leaves of both of the latter 2 varieties were riddled with flea-beetle punctures, and it is very probable that these insects could have a marked influence on yield.

Tuber injury from flea beetles was lowest on the Menominee, Pungo and Keswick varieties, and greatest on the Chippewa, Pontiac, and Cobbler.

A count of the wireworm tunnels in the tubers of the varieties showed no significant difference in infestation between varieties --all of them infested to an appreciable extent.

Kennebec and Menominee showed the least injury from leafhoppers, but Pontiac, Chippewa, Cherokee, and Cobbler were severely injured. Some of these varieties were so badly hurt that it was evident the leafhoppers helped to shorten the life of the potato plants.

Virginia (Hofmaster) table 2. Flea-beetle, wireworm, and leafhopper injury

Variety	Flea-beetle punctures or scars		Wireworm tunnels or scars 3/	Tipburn 4/ (Leafhopper)
	Foliage 1/	Tubers 2/		
Canso	654	17.8	10.8	4.3
Cherokee	688	25.0	12.0	6.5
Chippewa	877	33.3	17.8	7.0
Cobbler	917	32.8	17.5	5.5
Katahdin	544	27.0	14.8	3.5
Kennebec	359	18.8	10.3	0.8
Keswick	645	15.3	9.3	6.8
Menominee	138	12.3	9.8	0.8
Ontario	293	21.8	8.3	1.3
Pontiac	1055	32.8	15.5	7.8
Pungo	363	14.0	9.8	3.8
Sebago	366	18.0	9.3	1.8
L.S.D. 5%	92	6.8	not significant	1.1
" 1%	152	9.6	"	1.5

1/ Average flea-beetle punctures per 25 (0.5 square inch leaf samples) per replication. Five plants sampled per replication. Two lower leaves, two middle leaves and one top leaf selected at random from each plant. Sampled June 25, 1953.

2/ Twenty tubers selected from each replication and all flea-beetle punctures counted in a 1-square-inch area on each tuber. Sampled August 10.

Va. (Hofmaster) table 2 continued.

- 3/ Ten tubers selected from each replication and all wireworm punctures or scars counted. Sampled August 10.
- 4/ Rating code: 0 = no injury; 1-2 = trace; 3-4 = slight; 5-6 = medium; 7-8 = severe (tipburn on almost every leaflet). Rated June 25, 1953.

VIRGINIA (Norfolk)
M. M. Parker

Variety Yields from Irrigated and Non-Irrigated Plots

Ten commercial varieties were planted in 4 replications, each 50 seedpieces per row. The seed was dropped by hand 12 inches apart in rows 3 feet apart. A 5-10-5 fertilizer mixture was broadcast and plowed under at the rate of 500 pounds per acre. At the time of planting an additional 2,000 pounds per acre was placed in bands on each side of the seedpiece.

An overhead sprinkler type of irrigation was used in applying about 1 inch of water whenever the plants seemed to need moisture. The local 1953 potato season was dry and it was necessary to irrigate 8 times, some applications being made at intervals of 3 or 4 days. A buffer zone of 6 rows of potatoes separated the irrigated and non-irrigated plantings.

Results

The average yield of all varieties in the irrigated plot was 40 percent larger than that from the non-irrigated plot. Within the irrigated plot, Pontiac gave the highest yield of U.S. No. 1 potatoes; Pungo was second, and Chippewa third. Neither of these two varieties, however, yielded significantly lower than Pontiac. Canso and Sebago gave the lowest yields.

In the non-irrigated plot, Pungo gave the largest yield followed by Keswick and Pontiac. Neither of these two, however, was significantly lower than Pungo. Canso and Sebago produced the smallest yields.

The average yield from the irrigated and non-irrigated plots showed Pungo to be the highest producer, closely followed by Pontiac, Chippewa, Cobbler, and Keswick. Canso and Sebago again produced the lowest yield of all 10 varieties.

There was no interactional significance between varieties and irrigation.

The data for these tests are given in Va. (Parker) table 3.

Va. (Parker) table 3. Potato variety yields with and without irrigation, Norfolk, Va., in a mattopeake soil.

Variety	Yield U.S. No. 1 per acre		
	Irrigated	Not irrigated	Average
	Bu.	Bu.	Bu.
Canso	230	140	185
Cherokee	281	191	236
Chippewa	351	195	273
Cobbler	341	199	270
Katahdin	259	157	208
Kennebec	339	193	266
Keswick	332	206	269
Pontiac	390	201	295
Pungo	365	229	297
Sebago	213	140	176
L.S.D. at 5%	40.3	31.0	30.3
" at 1%	54.5	42.0	40.5

VIRGINIA (Norfolk)
M. M. Parker and T. J. Nugent

Scab-Resistant Trials

Several varieties and seedlings of Irish potatoes were planted in scab-infested land at Onley, Va., to determine their resistance to scab. Mean yields per acre of U.S. No. 1 potatoes were determined.

Four replicates, each replicate consisting of 25 seedpieces planted 14 inches apart in rows 3 feet apart, for the varieties, and 4 10-seedpiece replicates for the seedlings were randomized and planted March 27 and harvested August 10, 1953. For scab determination, approximately 50 potatoes were graded for scab severity and placed in 1 of 6 classes, namely, 0, none; 1, trace; 2, slight; 3, moderate; 4, severe; and 5, very severe. The number of potatoes in each class were multiplied by their respective numerical value, and the products were totaled and divided by the total number of potatoes graded. This number was multiplied by 20 to get a scab index ranging from 0 for no scab to 100 when all potatoes were very severely scabbed.

Results of Variety Trials

Scab and Yield Records: The data (Va Parker and Nugent table 4) taken on the amount of scab showed Ontario with the least scab but not significantly less than Cherokee. Menominee had only slightly more scab than Cherokee. The

varieties Cobbler, Chippewa, Keswick, Canso, Katahdin, and Kennebec were severely scabbed with no significant difference between them. Pontiac, Sebago, and Pungo were intermediate for scab.

Menominee with an average yield of 385 bushels of U.S. No. 1 potatoes per acre and Pungo with 375 bushels outyielded other varieties but were not significantly higher than Pontiac, 345 bushels and Sebago, 335 bushels. Canso yielded only 162 bushels per acre, which was significantly less than the yield of any other variety in this test.

Results of Seedling Trials

Scab and Yield Records: Seven seedling lines developed by the U.S.D.A. for scab resistance were planted in plots adjacent to the variety test plots, the results of which are shown in Va. (Parker and Nugent) table 4

Va.(Parker and Nugent) table 4. Scab index and yield of U.S. No. 1 potatoes for variety trials.

Variety	Scab index	Yield per acre U.S. #1 ^{1/}
		Bu.
Canso	54.4** ^{2/}	162**
Cherokee	16.8	282**
Chippewa	60.1**	259**
Cobbler	61.6**	242**
Katahdin	54.1**	239**
Kennebec	52.8**	315*
Keswick	58.4**	320*
Menominee	18.6*	385
Ontario	6.9	323*
Pontiac	46.7**	345
Pungo	36.3**	375
Sebago	42.6**	335
L.S.D. at 5% level	11.3	53.8
" 1% "	15.2	72.3

^{1/} Include scabby potatoes

^{2/} * and ** significantly different from the least scabbed and highest yielding variety at the 5-and 1-percent levels, respectively.

Early Gem (B 515-2) was practically free of scab, having an average scab index of only 2.5 for the 4 replicates. The seedling line B 3159 had a scab reading of 8.2. These 2 lines were outstanding in their scab resistance. Other seedling lines were comparable in their scab resistance to Pungo and Sebago grown in the adjacent variety trials.

The seedling B 2368-13 produced significantly higher yields (390 bu. per acre) U.S. No. 1 potatoes than any other line. Eight replicates were planted of the line B 595-76, but were treated in the analysis as 2 separate lines of 4 replicates each. As is noted in Va. (Parker and Nugent) table 5, the scab indices of this line were similar but yields were significantly different at the 5 percent level.

Va. (Parker and Nugent) table 5. Scab index and yield of U.S. No. 1 potatoes for the seedling lines

Seedling line	Scab index <u>1/</u>	Yield per acre <u>2/</u> U.S. No. 1
		Bu.
B 515-2	2.5	218
B 3159-1	8.2	143
B 3199-1	29.7	64
B 595-76	33.7	214
B 2368-13	35.4	390
B 56-19	35.4	187
B 595-76	37.5	137
B 56-11	46.2	143
L.S.D. at 5% level	16.0	70.5
" 1% "	21.8	95.5

1/ Scab reading of Cobbler in adjacent plots - 61.6

2/ Includes scabby potatoes.

Variety Response to Time of Cutting the Seed

The varieties Cobbler, Pungo, Sebago, and Kennebec were included in this test. Part of the seed of each variety was cut early and held for some time prior to planting and part was cut and planted immediately. The cut seed were further subdivided and treated with different seed-treatment dips (Captan, Ziram, Ziram plus a Sticker, and check) at time of cutting. Plantings were made at Norfolk and Onley, Va. At Norfolk the early cut seed was held under conditions favorable for suberization, while at Onley the temperatures during suberization varied over a wide range.

Each subtreatment was replicated 4 times. Each replicate consisting of 50 seedpieces was planted 1 foot apart in rows 3 feet apart. The plots at Norfolk were irrigated as needed.

Results

Since the various seed treatments had little effect on emergence and no significant effect on yield the results of the seed treatments are not included. The variety response to time of cutting was significant in most instances for both the stand counts and yields.

Stand Counts: With the exceptions of Kennebec at Norfolk and Pungo at Onley, all varieties produced higher stand counts when the seed was cut at time of planting. (Parker and Nugent table 6). In all cases, except with Pungo at Onley, the differences in stand counts for the varieties for the 2 times of cutting were highly significant. Kennebec was slow in emerging at both places. The poor emergence of this variety for the late cut seed at Norfolk was not fully determined, but may have been due to the use of home-grown seed for this one variety.

Va. (Parker-Nugent) table 6. Variety response to time of cutting the seed as indicated by stand counts.

Location	Time of cutting	Variety				Average for time of cutting
		Cobbler	Pungo	Sebago	Kennebec	
Norfolk	Early (2/23/53)	94.9	91.0	90.3	89.5	91.4
	Day planted 3/11/53)	98.8	98.0	94.0	69.0	89.9
	Average for varieties	96.8	94.5	92.1	79.3	
Onley	Early (3/1/53)	98.3	99.1	89.8	97.9	96.3
	Day planted (3/23-53)	99.6	98.5	98.1	99.5	98.9
	Average for varieties	98.9	98.8	93.9	98.7	
Norfolk	L.S.D. at 5 and 1% levels for varieties, 2.5 and 3.3; time of cutting, N.S.; interaction, 4.9 and 6.5.					
Onley	L.S.D. at 5 and 1% levels for varieties, 1.1 and 1.5; time of cutting, 0.8 and 1.1; interaction, 2.2 and 2.9.					

Yields: In the test at Norfolk, (Va. Parker-Nugent table 7) Pungo averaged 383 bushels of U.S. No. 1 potatoes per acre compared with 372 for Cobbler and 287 for both Sebago and Kennebec. At Onley (Parker-Nugent table 8) the yields of each variety were significantly different from all other varieties. Pungo produced the highest yield 320 bushels per acre U.S. No. 1 followed by Cobbler 275, Kennebec 225, and Sebago 175.

The average yields for all varieties at Norfolk were 332 bushels per acre for both the early and late cut seed and at Onley, 248 bushels per acre. Even though the yields averaged the same for both the early and late cut seed, the varieties did not react the same to time of cutting. At Norfolk, both Pungo and Cobbler produced higher yields with the seed cut at time of planting while the reverse was true with Sebago and Kennebec. At Onley, Pungo produced higher yields when the seed was cut early and was significantly different in this respect from the performance of the 3 other varieties.

In the 1952 trials at Norfolk, early cut Cobbler yielded 295 bushels per acre compared with 277 for seed cut at planting time, while early cut Sebago yielded 191 bushels per acre compared with 248 for seed cut at planting time. Since the reverse was true for both these varieties in the 1953 trials, it would indicate that factors other than time of cutting the seed, play an important part in determining their performance.

Va. (Parker-Mugent) table 7. Varietal response to time of cutting seed as indicated by yields at Norfolk, Va., on irrigated plots, in 1953.

Varieties	Time of cutting and yields			Date harvested
	Early (2-23) yield per A US #1	On day planted (3-11) Yield per A US #1	Mean yield per A	
	Bu.	Bu.	Bu.	
Cobbler	338	405	372	6-24
Pungo	375	390	383	7-8
Sebago	298	275	287	7-14
Kennebec	318	255	287	7-14
Mean for time of cutting	332	332		

L.S.D. for varieties at 5% level = 20.0

" 1% " = 26.3

L.S.D. for time of cutting at 5% level = No significance.

" for interaction between time of cutting and variety at 5% level
= 39.8; at 1% level = 52.8.

Va. (Parker-Mugent) table 8. Varietal response to time of cutting seed as indicated by yields at Onley, Va., in 1953.

Varieties	Time of cutting and yields			Date harvested
	Early (3-1) yield per A US #1	On day planted (3-23) yield per A US #1	Mean yield per A	
	Bu.	Bu.	Bu.	
Cobbler	272	277	275	7-16
Pungo	337	303	320	7-27
Sebago	170	180	175	8-11
Kennebec	217	232	225	7-27
Mean for time of cutting	248	248		

L.S.D. for varieties at 5% level = 18.5

" 1% " = 24.0

L.S.D. for time of cutting = No significance

" for interaction between time of cutting and variety at 5% level
= 37.0; at 1% level = No significance

WASHINGTON
J. D. Menzies

Field Testing of Potato Seedlings for Resistance to Leaf Roll

In several previous years we have attempted to grow single hills of new seedlings for increase so that 5 or more hills of each would be available the next year for leaf-roll exposure tests. It was found that not only leaf roll but also mosaic and purple-top-type viruses eliminated many of the seedlings in the first year, thus preventing a comparative test for leaf-roll resistance. This year, single seedling plots were established at the Northwestern Washington Experiment Station, Mt. Vernon, Wash., in cooperation with Martin Carstens.

These plots contained approximately 1,700 seedlings from 27 different crosses of parents combining leaf-roll resistance with some other desirable character. Most of the seed tubers had been produced in the greenhouse at Prosser during the winter, and others were grown by John McLean at Aberdeen, Idaho. Planting was delayed until July 1 to allow sprouting of the Prosser-grown tubers. Unfortunately, serious late-blight infection developed in these plots when the plants were 8 to 10 inches high. In spite of a blight-control program almost half of the seedlings were killed before producing tubers large enough to save. The survivors were left until early in November before they were harvested.

At harvesttime selections were made on the basis of tuber shape, skin characteristics, and flesh color. This rather severe elimination prior to leaf-roll testing has been decided upon now that some fairly good leaf-roll resistance is available for breeding purposes. Since it takes several years to evaluate a seedling for leaf-roll reaction, there is no point in carrying hundreds of horticulturally useless lots into this program.

Out of the original 1,700 lots only 279 were saved for testing next year (Wash. table 1). Some of these were saved without any judgment on tuber type because the tubers, as a result of blight killing of vines, were not large enough for conclusions. Most of the others were discarded because of rough, round tubers or objectionable yellow flesh. It was observed that crosses with the parent B 986-7 were frequently highly resistant to late blight.

Among these crosses were several in which Russet Burbank or B 515-2 were used as parents carrying the netted-skin character. Although B 515-2 is a netted-skin selection out of a Russet Burbank cross it did not transmit the netted-skin character in the crosses where it was used. This is in contrast to the Russet Burbank crosses which produced a useful percentage of netted-skin progeny.

In the leaf-roll tests at Prosser 26 seedlings saved from 5-hill plots in 1952 were field-tested for resistance in 10-hill plots. There had been a severe spread of mosaic in the plots in 1952 with the result that 11 of these lots were 100 percent infected with mosaic. One or more plants of leaf roll were

detected in each of the rest so all this group was eliminated from further testing (Wash. table 2)

Wash. table 1. Seedlings saved for leaf-roll resistance testing in 1954.
Grown at Mt. Vernon, Wash.

Cross No.	Parentage	Hills grown No.	Hills saved No.	Notes
A 179	B 515-2 x B 2963-7	45	11	Very susceptible to blight
A 190	Rus. Sebago x B 2963-7	60	45	
A 195	B 2963-4 x B 2756-6	60	20	
A 201	Sequoia x B 2963-7	60	25	Very blight-resistant
A 209	B 986-7 x Aquila	90	36	
A 226	1276-185 x B 2963-4	50	33	
A 200	B 579-3 x B 2963-7	75	11	Blight-resistant
A 225	1276-185 x 2756-2	65	17	
A 215	Harford x B 986-7	120	29	
A 227	1276-185 x B 2963-7	60	-	
A 180	B 515-2 x B 2756-2	75	9	
A 177	B 515-2 x Aquila	60	5	
A 188	Sequoia x B 515-2	45	3	
A 183	B 515-2 x B 986-7	90	0	
A 208	1276-185 x Aquila	30	5	
A 184	B 515-2 x Triumph	120	-	
A 6	B 2963 selfed	60	4	
A 7	B 2963-7 "	60	2	
A 216	Menominee x Aquila	80	4	Blight-resistant
A 168	Rus. Burbank x 1276-185	10	2	
A 214	Kennebec x B 986-7	45	4	
A 199	Menominee x B 2963-7	150	2	
A 170	Rus. Burbank x B 986-7	45	6	
A 207	B 986-7 x Ontario	75	3	
A 198	B 2913-24 x B 2963-7	60	1	Blight-resistant
A 5	B 515-2 selfed	30	-	
A 197	C.S. 6344 x B 2963-7	60	2	
			279	

Wash. table 2. Leaf-roll and mosaic reaction of seedlings grown in 20-hill lots, 1953, Prosser.

Cross	Seedlings	Disease reaction <u>1/</u>
	No.	
B 2761	1	100% leaf roll
B 2766	2	1 - 100% mosaic; other leaf-roll-infected.
B 2762	7	4 - 100% mosaic; rest leaf-roll-infected.
B 2700	11	2 - 100% mosaic; rest leaf-roll-infected.

1/ Includes chronic and current-season infection.

Plots of approximately 600 hills each of WP 57, 31, and 94 were grown for further evaluation following last year's tests showing that these were field-resistant to leaf roll. These 3 seedlings were also included in Vincent's statewide trials (which see). None of these appear to have commercial promise.

The seedling B 579-3 continues to react almost field immune to leaf roll. Our stock, however is heavily infected with a purple-top (aster yellows) type of virus. Several tons were produced, however, from severely rogued tuber-unit plantings. It is planned that this will be increased in a seed area next year. Although this seedling has many good characters, decision on its future should be deferred until clean stock is available in quantity for testing.

Uniform Scab Nursery for 1953

The scab nursery this year was in a portion of the same field used in 1952. Thirty-four varieties and seedlings were grown in duplicate 5-hill plots adjacent to a row of White Rose for the check variety. Scab was so severe that no marketable tubers were produced in the White Rose. Only 13 of the test varieties produced marketable tubers and only 2 --B 2162-49 and B 2162-36 --produced more than 50 percent marketables. These two selections from the same cross (B 381-2 x X528-170) are smooth, pink-skin, round varieties. Menominee, producing 27 percent marketable tubers, was the best of the named varieties. Neither Ontario nor Cherokee held up to the severe test given this year. It is possible that the Moses Lake test area is too severe for anything but final evaluation of highly resistant sorts. If used as a preliminary selection area, however, it would weed out all but the very best in a single season's test. Detailed results are shown in Washington table 3, to which is appended notes on most of the seedlings.

Wash. table 3. Uniform scab nursery, Moses Lake, Wash., 1953.

Variety	Area 1/		Type 2/		Marketable 3/		Average			Check Average		
	1	2	1	2	1	2	Ar	Ty	Mkt.	Ar.	Ty	Mkt.
					Pct.	Pct.			Pct.			Pct.
B 2162-49	T	T	1	1	95	80	T	1	87	5	5	0
B 2162-36	1	1	1	1	80	60	1	1	70	5	4.5	0
Menominee	1	1	1	1	45	10	1	1	27	5	5	0
B 3009-9	1	2	1	1	55	0	1.5	1	27	5	5	0
B 2879-4	1	2	1	1	50	0	1.5	1	25	5	5	0
B 73-10	1	3	1	2	40	0	2	1.5	20	4	5	0
B 2921-4	2	2	2	2	0	10	2	2	5	5	5	0
Ontario	1	2	2	2	5	5	1.5	2	5	4.5	5	0
B 3009-7	2	2	2	2	0	5	2	2	2.5	4.5	5	0
B 3006-22	2	5	3	4	5	0	3.5	3.5	2.5	4.5	5	0
ND1255-1	3	3	3	2	0	3	3	2.5	1.5	4	5	0
B 2874-4	2	2	2	3	1	2	2	2.5	1.5	5	5	0
B 515-2	2	2	4	3	0	2	2	3.5	1	4	5	0
B 595-76	3	2	1	2	0	0	2.5	1.5	0	5	5	0
B 3003-36	3	1	2	2	0	0	2	2	0	4.5	5	0
Cherokee	2	3	2	2	0	0	2.5	2	0	5	5	0

Wash. table 3 continued

Variety	Area <u>1/</u>		Type <u>2/</u>		Marketable <u>3/</u>		Average		Mkt.	Check average		
	1	2	1	2	1	2	Ar	Ty		Ar	Ty	Mkt
					Pct.	Pct.			Pct.			
B 2924-2	2	4	2	2	0	0	3	2	0	5	5	0
B 2920-13	2	4	2	3	0	0	3	3.5	0	5	5	0
B 2935-7	3	4	3	3	0	0	3	3.5	0	5	5	0
B 2968-66	4	3	4	3	0	0	3.5	3.5	0	4.5	5	0
B 2368-4	4	4	5	5	0	0	4	5	0	4.5	5	0
B 3003-27	4	4	4	5	0	0	4	4.5	0	4.5	5	0
B 2921-10	4	4	3	3	0	0	4	3	0	4.5	5	0
B 2920-13	4	4	5	5	0	0	4	5	0	4.5	5	0
B 2968-56	5	3	3	4	0	0	4	3.5	0	5	5	0
B 2922-15	5	5	4	4	0	0	5	4	0	4.5	4.5	0
B 2368-13	5	5	4	4	0	0	5	4	0	5	5	0
B 3004-9	5	4	5	5	0	0	4.5	5	0	4	4.5	0
B 2368-6	5	4	5	4	0	0	4.5	4.5	0	5	5	0
B 2969-12	5	5	3	5	0	0	5	4	0	5	5	0
B 3014-6	5	5	5	5	0	0	5	5	0	4.5	5	0
B 2922-26	5	5	5	5	0	0	5	5	0	4.5	5	0
MD457-1	5	5	5	5	0	0	5	5	0	5	5	0
B 2968-11	5	5	5	5	0	0	5	5	0	5	5	0

1/ Surface area covered

T = Less than 1%
 1 = 1 to 20%
 2 = 21 to 40%
 3 = 41 to 60%
 4 = 61 to 80%
 5 = 81 to 100%

2/ Type of pustule

1 = Small & superficial
 2 = Large but still superficial
 3 = Large, rough pustules
 4 = Large pustules, shallow holes
 5 = Large pustules, deep holes

3/ Marketable --less than 5% surface scabbed

Notes

B 515-2 Some scab resistance but cracks badly
 B 2162-36 A smooth pink-skin variety; tubers run small in size
 B 3014-6 Very scab-susceptible, extremely deep pits
 B 2968-66
 F 2935-7 Round white with slight russet
 B 2968-56 Small round russet
 B 2162-49 Smooth round pink with slight russet
 B 3009-9 Smooth, round, slight russet; most scab lesions very slight
 MD 1255-1 Scab inconspicuous in heavy russet skin
 B 3003-36 A smooth flat round white with very superficial scab
 B 2969-12 A round white, very susceptible
 B 2921-4 Small round russet with superficial scab --could pass
 F 2922-26 A white russet; very scabby in spite of heavy russet
 B 2920-13 Lesion very large and conspicuous

Wash. table 3 continued

B 2879-4	A smooth flat pink
B 2368-4	Very deep-pitted scab
B 2922-15	Russetted but very scabby
B 595-76	Scab lesion very inconspicuous; might make marketables; lesions tend to spread out into russet
B 3003-27	Scab deeply pitted
Ontario	Scab lesion small, smooth and erumpent --not very corky
B 2368-13	Round, red; very scabby, deep pits
ND 457-1	Deep-pitted scab; no resistance
B 2874-4	Pink-skin, round.
B 73-10	Lesions superficial; very similar to rough hide
B 2924-2	A round russet; lesions tend to be russetted
B 2968-11	Very heavy pitted scab; no resistance
Menominee	Tubers rough; many almost marketable
B 3009-7	Very small tubers
B 2368-6	No resistance
B 3006-22	Slightly russetted
B 3004-9	A very scabby russet
B 2920-13	Small, smooth white; no resistance
Cherokee	Many tubers almost clean enough for marketable
B 2921-10	A rough russet; no resistance

WASHINGTON 1/
S. B. Locke 1/

During 1952, 20 varieties were exposed at 3 locations to field infection with leaf-roll virus. Each planting consisted of 4 randomized blocks of 25-hill plots. Outside rows and every fifth row were planted to leaf-roll infected Netted Gem as a source of inoculum. The plots of a given variety in the different replicates were so arranged that 2 occurred next to the inoculum rows and 2 were 1 row removed from the inoculum row. No dusting or spraying for aphid control was practiced. Samples taken from each plot were indexed for virus content in the greenhouse during the winter of 1952-53.

The results of the 1952 field-exposure test appear in Wash. table 1. Leaf roll spread was greater than in 1951 at all 3 locations as shown by the location means. In fact, there has been a steady increase in field spread since the low of 1949. Seedling B 579-3, for the third season, has escaped infection completely. This represents the highest degree of resistance in any material tested in this program. Katahdin and Seedling B 922-21 also show a high degree of resistance in the table, however, the figure for the latter is based on very poor stands both in the field and in the greenhouse during indexing and therefore cannot be considered reliable. The most susceptible varieties were Netted Gem, Sebago, and Seedling ND 457, the latter having been tested only one season. The remaining varieties tend to group themselves in a more or less continuous series between the 2 extremes.

An opportunity presented itself to obtain some information on *Rhizoctonia* infection in these varieties grown from Pullman samples in greenhouse benches under conditions very favorable for infection. The data appearing in Wash. table 2 are the percentage of plants showing one or more lesions on the underground stems. No attempt was made to record the relative severity of attack. Such an attempt will be made in the future. These preliminary data point out marked differences in reaction of potato varieties toward *Rhizoctonia solani*.

1/ The work was done in cooperation with Dr. C. L. Vincent, Department of Horticulture.

Wash. table 1. Percentage leaf roll increase in potato varieties during 1952

Variety	Location and increase of leaf roll				
	Northwestern Washington Mt. Vernon	Central Washington Prosser	Eastern Washington Pullman	Average of 3 locations	Maximum
	Pct.	Pct.	Pct.	Pct.	Pct.
Caroga	51.7	4.9	33.6	29.9	51.7
Cherokee	13.6	47.6	19.0	26.7	47.6
Katahdin	18.0	6.6	0.9	8.5	18.0
Kennebec	44.4	49.2	30.2	41.3	49.2
La Soda	81.6	53.9	52.9	62.8	81.6
Menominee	30.5	47.0	35.8	37.6	47.0
Netted Gem	62.4	92.3	79.9	78.2	92.3
Red Warba	57.9	65.2	42.3	55.1	65.2
Sebago	64.0	91.3	79.9	78.4	91.3
Warba	47.9	51.8	51.5	50.4	51.8
Yampa	29.6	36.6	17.5	27.9	36.6
2911	54.9	14.1	56.4	41.8	56.4
Osage(C.S. 6316)	70.1	68.2	33.4	57.2	70.1
C.S. 9887	49.4	21.2	29.8	33.5	49.4
B 137-5	30.9	46.1	19.4	32.1	46.1
Early Gem(B 515-2)	18.4	59.0	33.7	37.0	59.0
B 579-3	0.0	0.0	0.0	0.0	0.0
B 922-21	0.0	31.9	4.6	12.2	31.9
C.S. 10287	14.9	68.9	56.0	45.0	68.9
ND 457	67.3	64.7	73.4	68.5	73.4
Location Average	40.4	46.0	37.5		

Wash. table 2. Percentage of plants infected with Rhizoctonia solani.

<u>Variety</u>	<u>Plants infected</u> Pct.
B 137-5	10.6
La Soda	13.0
Warba	18.3
Red Warba	22.1
Yampa	29.4
2911	38.7
ND 457	43.2
C.S. 6316	45.3
B 922-21	52.0
B 515-2	57.7
Netted Gem	59.0
Menominee	63.1
Sebago	66.1
Katahdin	66.4
Cherokee	73.0
9887	73.1
C.S. 10287	74.8
Kennebec	81.9
B 579-3	87.4
Canoga	93.2

WASHINGTON (Pullman)

C. L. Vincent

Potato variety testing has been carried on by the Washington Agricultural Experiment Station for many years. It is the chief way by which growers can be shown how the several new or untried potato varieties perform in comparison with Russet Burbank (Netted Gem), the leading potato grown commercially in the State.

Location of trial plots, the planting pattern, and the objectives sought were the same in 1953 as in previous years. Weather conditions, in general, were favorable for potato growing at Mt. Vernon, but at Pullman the yield was greatly reduced by dry weather during the period following blossoming. Here the tuber set was excellent but the potatoes failed to size. At Prosser the plots were irrigated at the necessary times to assure a yield.

Ignoring Pullman plantings entirely, it can be seen (Wash. table 1) that several varieties outyielded Russet Burbank at both Prosser (with irrigation) and Mt. Vernon (without irrigation). Pungo yielded the same at Mt. Vernon as at Prosser and gave the best yield at Pullman. Early Gem was watched with special interest as it is known to crack badly even at close spacing of 8 to 12 inches. This year proved to be no exception in this respect. The cracks are wide and shallow and usually net forms over the cracked area similar to the epidermis on the rest of the tuber. The variety is very free from knobs so characteristic of Russet Burbank which it greatly resembles. This variety is of interest mainly because it is early and is very similar to Russet Burbank in appearance.

Other varieties producing well with or without irrigation are Cherokee, Katahdin, Keswick, Progress, White Cloud, and Yampa. Tubers of N.D. 457 were not as large in size in 1953 as was found to be the case in previous trials. However, 457 is an early attractive-appearing variety, having a clear white skin and shallow eyes, and may be of value in home gardening. The dry-matter content of this potato has been high over the past two growing seasons. Yampa, while a good yielder, lacks a finished appearance, the tubers being generally rough. B 579-3 is a long, white flattened potato with a good number of shallow eyes. The skin, while not netted, is somewhat feathered. This variety is reputed to have desirable qualities for chip making. It has a high dry-matter content under the various test-growing conditions but is not a high yielder. Another objection to the variety is the unevenness of come-up following planting. Keswick is a broad-oblong-flat cream-colored potato of promise. Its dry-matter content compares favorably with that of the Russet Burbank. Canso, while yielding well and having a desirable dry-matter content, did not have the commercial appeal that Keswick possessed. It is a round-flattened potato with many shallow eyes and overall the tubers were inclined to be small. This is the first time Keswick and Canso have been planted in the variety-comparison plots in Washington. Selection 45.11-101 (named Redkote) was obtained from Ben Picha of Grand Forks, N. Dak. It is a round, red, shallow-eyed potato, and the tubers are inclined to be small under Washington conditions. It does not appear to have horticultural qualities outstandingly better than Pontiac which is one of its parents. It is reputed to have some scab resistance, although this characteristic was not checked.

Wash. table 1. The average yield of several potato varieties from 4 replications grown at 3 locations in Washington in 1953.

Variety	Yield of No. 1 potatoes per acre			Average yield per acre of varieties grown in 3 locations
	Prosser	Mt. Vernon	Pullman	
	Tons	Tons	Tons	Tons
Aquila			10	
B 137-5	16	16	9	13.6
B 579-13	13	11	3	9.0
Canso	15	16	6	12.3
Cherokee	18	19	8	15.0
CS 10212	12	10	2	8.0
CS 10220	8	11	8	9.0
Early Gem (B 515-2)	18	20	6	14.7
Furore (Sport 2)		15		
Katahdin	18	19	11	16.0
Keswick	20	22	10	17.3
L.D. 22	11	11	5	9.0
Miller Cross	19	24	8	17.0
M.D. 457	19	18	6	14.3
Rus. Burbank (Netted Gem)	15	17	9	13.7
Ostbote	16			
Progress	17	20	12	16.3
Pungo	23	23	16	20.7
Triumf	17	17		
White Cloud	19	16	8	14.3
W.P. 31	8	11	3	7.3
W.P. 57	16	19	9	14.7
W.P. 94	13	14	5	10.7
Yampa	16	20	12	16.0
Wilpo #2			4	
45.3-6	12	16	6	11.3
45.11-101 (Redkote)	15	13	8	12.0

Wash. table 2. Dry-matter content of potatoes based on specific gravity, 1953.

Variety	Places in Washington where grown		
	Prosser	Mt. Vernon	Pullman
	Dry matter	Dry matter	Dry matter
	Pct.	Pct.	Pct.
Aquila			25.8
B 137-5	19.9	19.9	23.0
B 579-3	23.4	23.5	24.8
Canso	22.8	23.0	24.5
Cherokee	23.0	20.4	--
CS 10212	19.9	16.5	20.9
CS 10220	21.2	20.7	16.5
Early Gem (B 515-2)	19.2	20.1	20.1
Furore (Sport II)	--	24.8	--
Katahdin	20.7	20.7	23.4
Keswick	22.4	21.9	24.5
L.D. 22	18.4	20.1	--
Miller Cross	22.2	21.9	22.4
N.D. 457	23.4	23.4	23.0
Russet Burbank (Netted Gem)	21.9	22.2	23.0
Ostbote	25.7	--	--
Progress	21.4	20.7	20.7
Pungo	23.2	21.2	23.5
Triumf	25.7	20.8	--
White Cloud	21.9	21.9	23.0
W.P. 31	19.1	21.7	20.1
W.P. 57	18.7	19.4	20.7
W.P. 94	21.2	19.9	23.5
Yampa	21.9	21.0	23.2
45.3-6	19.9	20.1	21.9
45.11-101 (Redkote)	21.7	20.4	24.5
Wilpo #2	--	--	25.7

WEST VIRGINIA
M. E. Gallegly

Late blight has been the subject of most of the potato disease work in West Virginia. The work has dealt with races of the late blight pathogen and with potato hosts with different genes for resistance to these races. In addition to the late blight work, a scab nursery is maintained for selecting scab-resistant genotypes.

Late Blight

Races of the potato late-blight fungus occurring in Scotland and Holland were imported from W. Black and C. Mastenbroek, respectively, as were the two sets of differential hosts used by these workers, so that their pathogenicity and host range could be compared with that of the United States' races (Mills' and Peterson's). The Phytophthora infestans races were brought into this country under restrictions laid down by the Bureau of Entomology and Plant Quarantine. The differential hosts were obtained through the Interregional Potato Introduction Station, Sturgeon Bay, Wis.

Inoculations of differential hosts of Scotland, Holland and United States' (Mills' and Peterson's) were made with all isolates or races of the fungus. The results confirm the relationship of potato races of P. infestans and genes for resistance to these races as shown in the International Nomenclature table shown on page 227. Thus, there are 4 genes for resistance to the common race (race 0), which may occur in varieties in combinations of 1, 2, 3, and 4 genes, for a total of 16 different genotypic combinations. Likewise, there are physiologic races of the fungus capable of parasitizing the different genotypes. At present, 16 different races of the fungus can be identified of which at least 13 have been found.

Preliminary results of inoculations of a number of Solanum demissum accessions with certain of these imported races indicate that there are more major genes (or gene) for resistance to late blight. Further work with these accessions is needed. The identification of a fifth gene (or more) for resistance would necessitate enlargement of the table showing race/^{and} gene relationship.

The numbered seedlings listed by Westover and Marvel in West Virginia tables 1, 2, and 3 have been selected for blight resistance. All susceptible segregates from a family line were eliminated, so that all future work will be with resistant stocks. Most of the blight-resistant seedlings have the R_1 gene for resistance. A few selections have the R_2 gene.

Family line B 3320 was received as being resistant to some of the more virulent races of the late -blight fungus. Results of inoculations with race 0 showed that the individuals in the family segregated 85 resistant and 73 susceptible. This indicated that only one major gene was present in a simplex

condition in the parents. All individuals were susceptible to race 2, establishing that resistant selections were R_2 genotypes. The resistant parent, B 922-3, also proved to be an R_2 genotype.

Late blight was present in the field plots located in the Tygart Valley near Huttonsville, W. Va. The disease was mild in 1953, but 4 different races of the fungus were isolated from these plots. Race 0 was the first to appear, followed by race 4, race 1 and race 1-4 on the genotypes, r, R_4 , R_1 and R_1R_4 , respectively. These races followed each other at approximately weekly intervals. Among the blight-resistant named varieties, Essex, Kennebec, Virgil, and Ashworth were the top yielders at Huttonsville. They all exceeded 500 bushels total yield per acre. A few of the seedling selections equal these varieties in yield. However, the blight-susceptible variety Pontiac surpassed all varieties in total yields this relatively dry year.

Scab

Many of the varieties and seedlings listed by Westover and Marvel in West Virginia tables 1, 2, and 3 have been tested for scab resistance in a scab plot located on the Agronomy Farm in Morgantown. In the tables these stocks listed which have resistance to scab are: Cherokee, Menominee, B 69-16, B 605-10, B 3320-23, I1058-4, I1073-3, I1082-2, I1085-2, I1092-3, I1092-5, I1092-13, and I1114-1. A few of the seedlings were not included in the 1953 scab test.

Report of Committee on Late Blight Investigations The Potato Association of America Submitted by M. E. Gallegly, Chairman

Relationship of Potato Races of Phytophthora infestans and Genes for Resistance

In breeding for resistance to potato late blight Dr. W. Black in Scotland found physiologic races of P. infestans and labeled them by letters of the alphabet. In the United States W. R. Mills and L. C. Peterson also found physiologic races of the fungus and likewise used the alphabet system. In Holland, C. Mastenbroek found physiologic races and used a letter-number system to designate them (N_1 , N_2 , etc.) All of these workers found the new races appearing on clones bred from Solanum demissum. These workers found 3 to 4 independent dominant genes for resistance and again used different schemes for designating these genes and gene combinations.

Since these different systems were creating confusion, the above-named workers exchanged differential hosts for comparative tests with their different races of the fungus. The results of this joint effort are in press in the Holland journal, Euphytica. (Now published. 2: 173-179. 1953)

The following table is based on their results as brought out by Black, Peterson, and Mills in the discussion following the Potato Late Blight Symposium held by the Potato Association of America at the 1953 meetings in Madison, Wis.

Note that the genes for resistance match up as well as do the races of the potato late blight fungus. Also note that a new international system of designating these genes and races is proposed.

The new system assigns the number zero (0) to the common field race formerly designated as races A or N₁. The recessive genotypes are susceptible to these races. The numbers 1, 2, 3, and 4 were assigned to the races appearing on the single gene genotypes R₁, R₂, R₃, and R₄; the numbers (1,2), (1,3), (1,4), (2,3), (2,4), and (3,4), were assigned to races appearing on the double genotypes R₁R₂, R₁R₃, R₁R₄, R₂R₃, R₂R₄, and R₃R₄; etc. These races are correctly designated as races one, one-two, one-two-three, etc., rather than races one, twelve, and one hundred twenty-three, etc.

This table is published here in order to familiarize potato workers with the new system. Copies of the table may be obtained by writing to M. E. Gallegly, Dept. of Plant Pathology, W. Va. University, Morgantown, W. Va.

The Committee on Late Blight Investigations
The Potato Association of America

M. E. Gallegly, Chairman
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Reiner Bonde
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J. L. Howatt
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L. C. Peterson

INTERNATIONAL SYSTEM OF DESIGNATING INTERRELATIONSHIPS OF GENES AND RACES

Genotype		Races of <i>P. infestans</i>											
		A	B ¹	H	J	D	C	E	B ²	C	I	F	
Scotland		A	B ¹	H	J	D	C	E	B ²	C	I	F	-
U.S.A.		A	D	G	-	B	-	-	B ¹¹	-	BC	-	-
Holland		N1	N2	N5	-	N4	-	-	N7	-	N6	-	N9
International*		O	1	2	3	4	12	13	14	23	24	34	123 124 134 234 1234
r	r	S	S	S	S	S	S	S	S	S	S	S	S
R ₁	D	-	S	-	-	-	S	S	S	-	-	S	S
R ₂	C	-	-	S	-	-	S	-	-	S	-	-	S
R ₃	-	-	-	-	S	-	-	S	-	S	-	S	S
R ₄	B	-	-	-	-	S	-	-	S	-	S	S	S
R ₁ R ₂	CD	-	-	-	-	-	S	-	-	-	-	S	S
R ₁ R ₃	-	-	-	-	-	-	-	S	-	-	-	S	S
R ₁ R ₄	BD	-	-	-	-	-	-	-	S	-	-	S	S
R ₂ R ₃	-	-	-	-	-	-	-	-	-	S	-	-	S
R ₂ R ₄	BC	-	-	-	-	-	-	-	-	-	-	-	S
R ₃ R ₄	-	-	-	-	-	-	-	-	-	-	S	-	S
R ₁ R ₂ R ₃	-	-	-	-	-	-	-	-	-	-	-	-	S
R ₁ R ₂ R ₄	BCD	-	-	-	-	-	-	-	-	-	-	-	S
R ₁ R ₃ R ₄	-	-	-	-	-	-	-	-	-	-	-	-	S
R ₂ R ₃ R ₄	-	-	-	-	-	-	-	-	-	-	-	-	S
R ₁ R ₂ R ₃ R ₄	-	-	-	-	-	-	-	-	-	-	-	-	S

* Races (2,3), (1,2,3) and (1,2,3,4) are hypothetical in the above collection but reports indicate that these missing races occur in Canada and in Mexico.

- = Resistant S = Susceptible

WEST VIRGINIA

K. C. Westover and Mason E. Marvel

As in the past, the testing and selection for desirable horticultural characteristics as yield, appearance, dry weight, etc., were carried on at the Reedsville Experiment Farm by the Department of Horticulture. Breeding and testing for disease resistance was in progress at Huttonsville, W. Va., and at the pathological greenhouses at Morgantown by the Department of Plant Pathology. Insofar as possible, without interruption of the breeding program, all seedstocks other than those known to be resistant to ordinary late blight have been discarded.

Weather conditions throughout the southern Pennsylvania --northern West Virginia area were normal until about mid-June after which it became critically dry for the remainder of the season. In view of this, emphasis was given to the selection of those high-yielding seedstocks having a heavy set of attractive though, in many instances, small tubers. All the plantings at the Reedsville Farm were on a well-drained shaley or silty loam (Clymer) soil in good tilth. A clover sod was turned under immediately before planting and at planting time a 1,600-pound application of a 5-10-10 commercial fertilizer was applied bandwise. The plantings were killed on September 16 and harvested about 2 weeks later. Specific gravity determinations were made from two 10-tuber samples from each plot. It is probable that because of the extremely dry soil conditions that prevailed during the greater part of the season when the crop was developing that the dry-matter values are somewhat higher than could normally be expected.

Family Line Planting. About 3,000 tubers from 32 family lines from Iowa and Beltsville, Md., were planted and over 200 selections made. All of this material had been screened for resistance to common late blight. The tubers of the respective lines were machine-planted and spaced 40 inches apart in the row.

10-Hill Unit Planting. From the 91 seedling units of this planting, 33 selections were made. The unit hills were 20 inches apart and the units were 50 inches apart in the row. Check units of certified Cobbler and Sebago stock occurred alternately every third unit in the row and were staggered in the planting so that each seedling unit was flanked by at least one of the check varieties and was not more than a row removed from the other. W. Va. table 1 gives the summarized information obtained for 25 of the higher-yielding selections.

50-Foot Row Planting. This planting comprised a single 50-foot row each of 44 stocks of which 36 were selections from or seedling selections made here from family lines received from Beltsville, Md., and Iowa. The remaining 8 stocks were named varieties. Certified Cobbler and Sebago check rows were planted alternately every third row so that each seedstock under observation was flanked by one of the check varieties and was not more than a row removed from the other. W. Va. table 2 summarizes the data from the selections retained from this planting.

Replicated Planting. Seedling stocks which have survived several preliminary trials, together with named varieties of established value or promise, were planted in this trial. It consisted of 4 replications of 50-foot, single-row plot of each of 7 seedling and 9 named varieties planted in an incomplete block (lattice) arrangement. Specific gravity determinations were made immediately at harvest. W. Va. table 3 summarizes the data from this planting.

W. Va. table 1. Yields, dry weights, and disease resistance information from 10-hill unit plantings, Reedsville Experiment Farm, 1953.

Variety ^{1/}	Parentage	Yield per A		Dry	Bred for
		U.S. No.1	Off-grade	weight	resistance to
		Bu.	Pct.	Pct.	
Cobbler	av. of 24 checks	305	7.1	20.2	
Sebago	av. of 23 checks	299	10.8	19.8	
I 1064-2	B 1276-185 x B 874-25	562	5.6	18.5	S-RR
1073-3	B 2087-Ia5 x B 962-32	537	14.7	21.7	S
1092-13	Teton x B 962-32	494	8.1	17.9	S-RR
1055-2	B 962-9 x M113.43	410	6.0	21.2	S
B 3320-23	B 922-3 x Menominee	396	8.4	22.2	S-VW
I 1065-3	B 1276-185 x B 962-9	376	7.2	24.0	S-LR
1081-3	M43.41 x B 874-25	376	10.7	22.6	S
1061-2	B 991-114 x B 96-56	372	2.7	19.2	S-RR
1058-7	B 962-32 x B 762-46	360	3.1	20.6	S-RR
B 3320-13		360	8.2	19.6	S-VW
I 1114-1	B 776-2 x B 962-32	344	8.5	21.8	S-X
1092-8		331	15.2	23.7	S-RR
1081-2		324	22.6	22.0	S
1091-1	Teton x B 962-9	311	9.7	23.6	S
1082-2	M225.43 x B 61-3	309	9.8	22.1	S-RR
1092-3		309	7.8	23.0	S-RR
1085-3	Progress x B 962-9	295	23.1	24.7	S
1075-3	X26-8 x B 874-24	292	4.7	19.7	S
1092-5		274	18.9	23.0	S-RR
B 3320-14		267	11.6	22.1	S-VW
I 1085-2		264	25.7	21.7	S
1058-4	B 962-32 x B 762-46	260	10.1	23.3	S-RR
1079-4	M49.40 x B 962-9	259	6.3	20.8	S
1079-2		256	8.8	21.6	S
B 3320-24		248	5.5	22.1	S-VW

^{1/} All seedling stocks were screened for resistance to the common race of late blight; B 3320 selections have the R₂ gene; all others have the R₁ gene.

S = Scab RR = Ring rot LR = Leaf roll VW = Verticillium wilt

W. Va. table 2. Yields, dry-matter readings and disease resistance information from selections from 50-row trials, Reedsville Experiment Farm, 1953.

Variety	Parentage	Yield per A	Off-grade	Dry matter	Resistant to ^{1/}
		U.S. No. 1			
		Bu.	Pct.	Pct.	
Cobbler	Av. of 12 checks	323	7.5	21.1	
Sebago	" " " "	229	14.7	19.2	
B 922-3 W.Va.	TI5 x B 355-24	337	9.3	18.4	LB
Pungo		323	7.5	19.3	
Ashworth	E C U - 1 Cornell	307	10.2	21.7	
Chenango	C U 1 - 2 Cornell	300	11.2	20.2	
Virgil		291	12.9	19.9	
I 916-6 W.Va.	B 76-23 x M117.43-3	248	9.8	24.1	LB-S
I 915-2	B 76-23 x M113.43-1	247	6.1	21.8	LB
I 8168-1	6316 x B 766-88	245	6.8	18.3	LB
Chippewa		233	11.6	19.2	
Cherokee		229	15.4	21.7	
I 933-3 W.Va.	B607-72 x M113.43	227	16.4	23.2	LB
Houma		213	18.8	19.6	
Placid		206	29.4	19.9	
I 977-1 W. Va.	1712-1 x B 67-11	174	21.9	22.9	LB

^{1/} Following the new international system, all selections listed as late-blight-resistant are R₁ genotypes except B 922-3 which is an R₂ genotype.

W. Va. table 3. Yields, dry-matter readings and disease resistance information from replicated trials, Reedsville Experiment Farm, 1953.

Variety	Parentage	Yield per A	Off-grade	Dry matter	Resistant to
		U.S. No. 1			
		Bu.	Pct.	Pct.	
Essex		332	5.5	18.5	Late blight
B 69-16	Katahdin x 96-56	295	5.3	20.9	do
Kennebec	B 127 x 96-56	263	14.3	18.6	
Pontiac		259	22.1	19.0	
B 313-21	Sequoia x 96-56	221	15.2	19.0	Late blight
Sebago		214	15.1	18.8	
Katahdin		213	10.1	20.1	
Menominee		209	16.7	19.8	Scab
B 2911-32	B 446-54 x Teton	208	17.1	19.8	Late blight
Cobbler		207	18.5	19.7	
B 2858-5	B 381-2 x Katahdin	203	3.2	20.5	
Canso		201	8.9	21.2	Late blight
I 933-4	B 607-72 x M113.43	198	21.7	18.9	do
B 605-10	Pungo x 96-56	193	9.4	19.3	do
Snowdrift		174	15.5	20.1	do leaf roll
B 2924-8	B 608-56 x B 594-46	170	12.2	19.6	Late blight
L.S.D.	5%	55.8			
"	1%	74.9			

WISCONSIN

R. H. Larson and R. V. Akeley

Incidence of Physiological Internal Tuber Necrosis

Seven standard potato varieties and eight seedling varieties were tested during 1953 for resistance to the nonparasitic internal tuber necrosis at the Hancock Substation. The indices are given in the Larson-Akeley table 1.

Larson-Akeley table 1. Occurrence of internal tuber necrosis in potato and seedling varieties.

<u>Variety</u>	<u>Necrotic index^{1/}</u>
Triumph	0.0
Pungo	.0
Canus	2.0
LaSoda	2.7
Keswick	3.1
Canso	4.0
Early Gem	4.1
Ontario	36.0
B 605-10	.0
B 606-67	1.3
B 355-44	2.0
B 991-14	7.0
B 595-76	9.3
B 2368-11	10.6
B 73-18	22.2
B 2368-4	31.0

^{1/} Index: 100 = All tubers with severe internal necrosis
0 = All tubers free of internal necrosis

In 1953, internal tuber necrosis was found on upland and muck soils in Racine County and on upland soils in Oneida County.

WISCONSIN

G. H. Rieman, D. C. Cooper, R. H. Larson and Donald A. Young

National Scab Testing Program

A national scab-testing program has been in operation for several years at seven State Experiment stations and the United States Department of Agriculture. The objectives of the program are as follows: (1) To determine the range of pathogenicity of the scab organism in the United States and (2) to determine the resistance to scab of seedling stocks of potential breeding value.

Seedling number B 515-2, listed in Wisconsin table 1, has recently been released by the North Dakota and Idaho Agricultural Experiment Stations and U.S.D.A. under the variety name Early Gem. This new variety showed the highest resistance to scab among the scab-resistant selections included in the national scab-nursery test in Wisconsin during 1953. The new Early Gem variety demonstrated similar high resistance to scab in the national scab tests made during 1952 in seven potato-producing States.

Various stocks listed in Wisconsin table 1 have been used as parents in the breeding work at this station. Seedling B 595-76 is of special interest since it carries resistance to viruses A and X, common strain of late blight, verticillium wilt, and common scab.

Effect of Virus X on Yield in the Chippewa Potato Variety

The 7 clonal lines of Chippewa listed in Wisconsin table 2 were all derived from a single latent mosaic-free tuber grown during the summer of 1950. The tuber was cut into 8 seedpieces from which 8 plants were grown in the greenhouse during the winter of 1950-51. The plants were tested on tobacco plants carrying the Y virus and found to be free from virus X. Five outstanding clonal lines of Chippewa used on a commercial basis in the State were tested in a similar fashion and found to be 100 percent infected with virus X. Plants from 1 of these clonal lines of Chippewa appeared to be infected with 2 mild strains of virus X. One of these related strains, called Chippewa 5-, was very slow in producing weak synergistic symptoms on seedling plants of tobacco previously infected with the Y virus. The other related strain, called Chippewa 5+, appeared to be similar to the mild virus-X strains found in the 4 other commercially established clonal lines of Chippewa.

Six of the eight virus-free plants grown from a single tuber were infected with mild strains of virus X. This was done by grafting two virus-X infected scions from one of the commercially established Chippewa clonal lines onto one of the virus-X-free plants. In this way six potentially different mild strains of virus X were established in as genetically similar clonal lines as possible. In addition, two genetically similar as possible virus-free clones were maintained from the same virus-free tuber.

Wis. table 1. Uniform scab nurseries, Antigo, Wisconsin, 1953.

Variety	Replication 1 ^{1/}				Replication 2 ^{1/}			
	Seedling		Check ^{2/}		Seedling		Check	
	Ar	Ty	Ar	Ty	Ar	Ty	Ar	Ty
B 73-10	1	2	3	4	1	2	3	4
B 515-2	T	1	3	4	T	1	3	4
B 595-76	2	2	4	4	2	2	3	4
N3162-18	1	2	3	4	1	2	4	4
B 2162-36	1	2	3	4	1	1	4	4
B 2162-49	1	1	3	4	1	2	4	4
B 2368-4	2	3	3	4	2	3	3	4
B 2368-6	2	2	3	4	2	3	3	4
B 2368-13	2	3	3	4	2	3	3	4
B 2874-4	1	1	3	4	1	2	3	4
B 2879-4	2	2	3	4	2	2	2	3
B 2920-13	2	2	3	4	1	2	3	4
B 2921-4	1	2	3	4	1	1	2	3
B 2921-10	2	2	3	4	2	2	2	4
B 2922-15	3	3	3	4	2	2	2	4
B 2922-26	3	3	3	4	2	3	2	4
B 2924-2	3	3	3	4	2	2	2	4
B 2934-7	2	3	3	4	2	2	2	3
B 2868-11	3	3	3	4	2	3	2	4
B 2968-56	3	3	4	4	2	2	3	4
B 2968-66	3	4	3	4	2	3	2	4
B 2969-12	3	3	3	4	2	3	3	4
B 3003-27	2	2	4	4	2	3	4	4
B 3003-36	1	2	4	4	2	2	3	4
B 3004-9	3	3	3	4	3	3	3	4
B 3006-22	2	2	4	4	2	3	3	4
B 3009-7	1	2	4	4	2	2	4	4
B 3009-9	2	2	4	4	2	2	4	4
B 3014-6	2	3	3	4	2	3	4	4
ND457-1	3	3	3	4	2	3	3	4
ND1255-1	2	3	4	4	3	3	4	4
Cherokee	2	2	4	4	2	2	4	4
Ontario	1	2	4	4	1	2	4	4
Menominee	1	1	3	4	1	2	4	4

^{1/} 5-hill replicates

^{2/} Check, Irish Cobbler

Wis. table 2. Effect of virus X on yield in the Chippewa potato variety, 1953.

Chippewa lines	Yield					Total	Yield per	
	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Rep. 5		acre	Loss
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Bu.	Pct.
XF (Virus X-free)	76.5	74.0	60.5	62.5	71.0	344.5	370	--
X5-	68.0	61.0	71.5	57.0	65.5	323.0	347	6
XRC	75.0	54.0	66.5	58.0	56.5	310.5	333	10
X5+	75.0	57.0	61.0	49.5	60.0	302.5	325	12
X9	64.5	60.0	45.0	65.0	58.0	292.5	314	15
X20	50.5	54.0	64.0	56.5	67.0	292.0	314	15
XWB	63.0	62.5	41.0	57.0	57.0	280.0	302	19
Average loss								13

The 6 virus-X-infected plants and the 2 virus-free plants were grown to maturity in the greenhouse. The tubers were held in cold storage during the summer and planted in the greenhouse during the winter of 1951-52. The plants grown from virus-X-infected stock were tested on tobacco carrying virus Y and found to be 100 percent infected. The plants grown from virus-X-free stock were also tested on tobacco carrying virus Y and found to be 100 percent healthy. An immature greenhouse-grown tuber crop was harvested in the spring of 1952. The virus-infected stocks and the virus-free stocks were increased in isolated field plots at Rhinelander during the summer of 1952. The virus-free stocks growing in tuber lines at Rhinelander were tested on tobacco carrying virus Y and found to be free from virus X.

The 6 clonal lines infected with virus X and 1 of the virus-free clonal lines were planted in a yield trial at Rhinelander during 1953. The results for 5 randomized single-row 30-hill plots for each clonal line are presented in Wisconsin table 2.

The data presented in Wisconsin table 2 indicates that highly attenuated strains of virus X may exist among the so-called mild strains which normally produce no symptoms on most potato varieties once they are established and a mild mottle symptom on tobacco. The 5- strain of virus X in the Chippewa line X5- caused only a 6% loss in comparison with the virus-free Chippewa line XF, whereas, the mild virus strains RC, 5+, 9, 20, and WB in genetically similar Chippewa lines caused an average loss of 13%¹ comparison with the virus-free Chippewa line XF.

Thus far the practice of "immunizing" new varieties of potatoes with a known mild strain of virus X has not been tried. The 5- strain of virus X tested in this experiment may prove to be most useful for this purpose. Immunization by means of attenuated living infectious agents has been used for many years to protect individuals from certain diseases of humans such as rabies and smallpox. The method may also have merit in the control of certain plant diseases.

Wis. table 3. Yield, percentage of U.S. No. 1 tubers, specific gravity, and scab resistance of advanced-generation selections from North-Central States in comparison with three standard varieties grown at Rhinelander, Wisconsin, 1953.

Variety	Entry No.	Stand hills No.	Maturity	Total yield per plot		Solids Pct.	Scab reading $\frac{1}{2}$	
				Lb.	Pct.		Ar	Ty
Cobbler ck	1	25	2	54.5	91	20.5	3	3
Triumph ck	2	25	2	63.0	95	18.9	4	4
Neb. 89.46-1	3	24	2	38.0	92	18.7	3	4
" 26.44-1	4	24	3	60.5	96	23.0	3	4
" 127.47-1	5	25	3	49.0	96	20.9	4	4
Min. 358	6	24	2	44.0	91	22.7	4	4
Min. 24	7	23	2	50.5	92	20.5	4	4
Kan. Pungo	8	25	3	51.0	98	21.2	2	3
" B 69-16	9	24	4	46.0	96	24.0	2	3
" B 606-67	10	24	3	62.5	97	23.0	3	3
ND Manota	11	24	2	55.5	87	20.5	1	3
" B 515-2	12	24	1	53.5	94	19.5	T	1
Wis. 27.50	13	24	2	49.5	91	20.4	2	2
Mich. 1363	14	24	3	40.0	93	20.4	2	2
Katahdin ck	15	25	3	38.5	96	22.4	2	3
Wis. 1301	16	24	3	46.0	96	21.8	2	2
Wis. M804	17	20	4	34.0	91	20.7	1	1
Min. 44-2	18	22	-	8.5	82	--	-	-
ND 457-1	19	24	3	32.0	80	22.2	T	1
ND Redkote	20	25	3	43.0	91	20.4	1	2
Ia. 6316	21	20	3	28.5	95	21.9	1	2
Ia. Cherokee	22	25	3	39.5	92	23.7	1	2
Ia. X26-8	23	Not received		--	--	--	-	-
Mich. R77-29	24	25	3	28.5	60	19.5	1	2
" BP46-4	25	23	3	20.5	63	20.5	2	2

1/ Scab readings based on 5-hill sample, Antigo, Wisconsin, scab plot.

North-Central Regional Potato Trials - 1953.

Twenty-four advanced-generation selections and newly named varieties from Michigan, Minnesota, North Dakota, Iowa, Nebraska, Wisconsin, and Kansas were grown in an adaptation trial on a sandy loam soil at Rhinelander, Wis. The results of this test are given in Wis. table 3. Standard procedure for experimental design and methods of evaluation agreed upon by members of the North-Central Committee were followed. (See C. E. Peterson report.) The following advanced-generation selections and newly named varieties appeared to show promise as new varieties or as parental breeding stocks:

Neb. 89.46-1 - Early; very good red color and smooth shape; one of the best reds.

Min. 24 - Early; attractive smooth oval; one of the best round whites.

Manota - Early; smooth attractive white oval of uniform medium size.

B 515-2 - First early; very good blocky Russet Burbank type; large tubers smooth; some growth cracks.

Wis. 1301 - Medium season; very good shape, size and color; one of best reds.

WYOMING

Wm. A. Riedl, J. R. Vaughn, C. M. Rincker, G. W. Arnold

The work in Wyoming consisted as in previous years of testing varieties and promising seedlings for yield, starch content, and resistance to scab and ring rot. In the breeding work emphasis is placed on the development and selection of red-skin varieties with high starch content and good keeping qualities that are resistant to scab and ring rot and to mechanical injury.

Variety and Seedling Yield Trials

Five yield trials with 18 varieties and 65 seedlings were conducted at Laramie in 40-foot single-row plots replicated 4 times. The total yield, yield of U.S. #1, the percentage of U.S. No. 1, and starch content were obtained. Wyo. tables 1, 2, and 3 show the results of 3 of these trials. Summarization of the balance of the data is not completed at the present time. In addition to the replicated trials, 75 newly developed seedlings were tested in single-row plots, 40-feet long without replication. Seventy-two seedlings were grown in 4-hill rows for observation. Variety yield trials were also conducted at 2 substations.

Seedling Increase

Eighteen promising seedlings were increased at Laramie. Fourteen of these were saved for further increase. Nine promising seedlings were increased at Torrington, five of which were saved for further increase.

Ring-rot Studies

Eight ring-rot-resistant varieties and seedlings were tested for ring-rot resistance. The Bliss Triumph checks had 92 percent of the plants showing ring-rot symptoms. Teton had 25 percent of the plants showing questionable symptoms --one seedling had 5 percent and another had 2.5 percent of the plants showing questionable ring-rot symptoms. Four seedlings showed no ring-rot symptoms.

Scab Uniform Nursery

The uniform scab nursery was grown at Laramie. Soil infestation was not heavy, as indicated by the relatively light infection on the Bliss Triumph check. Tuber development was poor because of soil in the plot. The figures in Wyo. table 4 give the area covered, type pustule, and percentage of marketable tubers. Tuber size was not considered in calculating the percentage of marketable tubers.

Wyo. table 1. Potato variety yield trial, Laramie, Wyo., 1953.

Variety	Yield per acre					Starch content
	Total	U.S. No. 1	Rank of U.S. No. 1	U.S. No. 1	Rank of percent U.S. No. 1	
	Bu.	Bu.		Pct.		Pct.
Desoto	499	427	1	86	6	14.6
Satapa	479	375	6	78	16	13.5
Bliss Triumph	476	404	2	85	7	13.9
Red Pontiac	473	381	4	80	13	13.7
Katahdin x 471	467	399	3	85	7	14.8
Pontiac	466	361	8	78	16	Discarded
Red McClure	449	369	7	82	10	16.1
Kennebec	440	354	10	80	13	16.3
White Rose	423	321	15	76	19	13.7
Yampa	419	378	5	90	2	15.9
Seedling 2154	413	351	11	85	7	16.5
Progress	408	287	20	70	21	13.7
Kasota	407	334	13	82	10	Discarded
627-103	399	307	18	77	18	17.1
Red Warba	393	313	17	80	13	Discarded
Irish Cobbler	390	345	12	88	4	14.8
White Cloud	392	357	9	91	1	Discarded
Burbank	384	278	21	72	20	14.1
Katahdin	371	325	14	88	4	14.8
Teton	365	299	19	82	10	14.4
Russet Rural	357	319	16	89	3	15.0
L.S.D. at 5%	50	60				

Wyo. table 2. Potato seedling yield trial No. 1, Laramie, Wyo.

Seedling No.	Yield per acre					
	Total	U.S. No. 1	Rank	U.S. No. 1	Rank of percent U.S. #1	Starch
	Bu.	Bu.		Pct.		Pct.
2379	505	458	1	90.7	1	14.8
Bliss Triumph	499	399	5	79.9	16	13.9
2480	495	407	3	82.2	12	-
2479	489	410	2	83.8	4	14.1
2483	486	402	4	82.7	9	13.3
2534	478	389	6	81.4	13	-
2361	476	383	7	80.5	15	-
2533	460	380	9	82.6	10	-
2485	455	375	11	82.4	11	16.5
2474	449	381	8	84.9	3	13.3
2488	440	378	10	85.9	2	12.0
Sheridan	441	339	12	81.3	14	13.9
2526	398	310	16	77.9	17	--
2484	395	330	14	83.5	5	14.5
2476	380	316	15	83.2	6	-
2486	369	262	18	71.0	18	-
2541	404	336	13	83.2	6	13.5
Dazoc	2482	284	17	82.8	8	13.5
L.S.D. at 5%	50	36				

Wyo. table 3. Potato yield trial No. 2, Laramie, Wyo.

Seedling No.	Yield per acre					
	Total	U.S. No. 1	Rank	U.S. No. 1	Rank of percent U.S. #1	Starch
	Bu.	Bu.		Pct.		Pct.
2557	578	481	1	83.2	11	13.5
Bliss Triumph	525	420	4	80.0	14	13.4
2556	499	422	3	84.6	9	13.9
2549	490	431	2	88.0	4	14.8
2550	473	416	5	87.9	5	16.5
2558	473	414	6	87.5	6	15.4
2542	463	413	7	89.2	1	13.7
2560	463	410	8	88.6	3	12.9
2554	458	387	9	84.5	10	-
2547	454	355	14	78.2	16	-
2552	449	358	13	79.7	15	-
2559	442	378	10	85.5	8	14.8
2564	428	351	15	82.0	13	-
2551	428	368	12	86.0	7	-
2565	427	325	17	76.1	18	16.5
2548	425	377	11	88.7	2	13.5
2561	414	342	16	82.6	12	-
2553	298	233	18	78.2	16	-
L.S.D. at 5%	42	43				

Wyo. table 4. Potato scab uniform nursery, Laramie, Wyo., 1953
by John R. Vaughn

Variety or seedling	Replication 1			Replication 2		
	Ar	TY	Mktble.	Ar.	TY	Mktble.
			Pct.			Pct.
Check (BT)	1	3	80	1	2	100
Cherokee	0	0	100	0	0	100
Menominee	Tr	1-	100	Tr	1-	100
Ontario	0	0	100	Tr	1	100
B 73-10	1	1	100	1	1	100
Early Gem (B515-2)	Tr	1	100	Tr	1	100
B 595-76	0	0	100	Tr	2	100
B 2162-18	Tr	1-	100	1	2	100
B 2162-36	Tr	1	100	1	2	100
B 2162-49	Tr	1-	100	Tr	1-	100
B 2368-4	1	3	90	1	2	100
B 2368-6	Tr	1	100	3	3	80
B 2368-13	Tr	1-	100	1	2	100
B 2874-4	Tr	1	100	Tr	1-	100
B 2879-4	Tr	1-	100	Tr	2	100
B 2920-13	Tr	1	100	0	0	100
B 2920-20	Tr	1	100	Tr	1-	100
B 2921-4	1	1	100	Tr	1-	100
B 2921-10	Tr	1-	100	1	2	95
Check (BT)	1	3	80	1	3	90
B 2922-15	Tr	2	100	1	2	95
B 2922-26	3	4	50	1	1	95
B 2924-2	Tr	1	100	Tr	2	100
B 2935-7	1	1	100	1	1	95
B 2968-11	0	0	100	Tr	1	100
B 2968-56	1	2	100	Tr	2	100
B 2968-66	Tr	1	100	1	3	90
B 2969-12	1	2	90	2	3	80
B 3003-27	Tr	1-	100	Tr	2	100
B 3003-36	2	1	90	Tr	1	100
B 3004-9	0	0	100	2	2	80
B 3006-22	0	0	100	0	0	100
B 3009-7	Tr	1	100	2	1	100
B 3009-9	Tr	1	100	Tr	1-	100
B 3014-6	Tr	1-	100	Tr	1-	100
ND 1255-1	Tr	1-	100	1	1	100
ND 457-1	Tr	1-	100	Tr	1-	100
Check (BT)	2	3	90	1	3	90

Scab infection was light and not uniform in the plot.

Bliss Triumph was used as a check variety.

GUATEMALA

Instituto Agropecuario Nacional, a Cooperative Agricultural Experiment
Station Maintained and Operated by the Governments of Guatemala
and the United States of America

Preliminary results from potato trials established in April 1953 continued to support the results of previous trials in demonstrating the feasibility of potato production in the highlands during the rainy season. In previous trials certain Dutch varieties had demonstrated a high degree of resistance to late blight caused by Phytophthora infestans which is the principal factor limiting the production of potatoes in the highlands during the rainy season. In trials this year several varieties and several seedlings of the United States were included.

The varieties Cherokee and Placid, as well as some of the seedlings, proved to be practically immune ^{from} late blight. Under the same conditions, varieties Up-to-Date, Bintje, and some native varieties were completely killed in 8 weeks. Preliminary harvest of the variety Cherokee showed yields of U.S. No. 1 potatoes of about 300 bushels per acre with Placid yielding about 250 bushels. The production of U.S. No. 1 tubers by Bintje and Up-to-Date was practically nil. The highlands with its cool and invigorating climate is the home of the majority of the Indians in Guatemala. They are not able to produce enough food for their own needs. For this reason, great emphasis is placed on the production of basic foods in the highlands.

MEXICO (Rockefeller Foundation)

John S. Niederhauser 1/

Report on 1953 Toluca (Mexico) Field Test for Late Blight
Resistance of Seedlings Sent by Dr. F. J. Stevenson,
U.S.D.A.

The test was planted May 28-29, 1953, in Lote V, Santa Elena, Toluca. A total of 3,779 seedlings were planted in consecutive order (our US-19 to US-89) in rows with 30 plants each, 30 cm. apart in row, with a check plant (variety Up-to-Date) at the head of each row and after each 10 seedlings in the row. Fertilizer was applied at time of planting - about 1,000 kgs./ha. of a 6-12-6. Tubers planted were small, averaging about $\frac{1}{2}$ " diameter, but were well sprouted when planted. Growing conditions were good through the season. Rainfall, though not excessive, was abundant and the soil was never dry.

Readings were made on the severity of attack and the type of lesion produced. Severity of attack was judged as follows:

0 = No lesions.

1 = Very few; had to look to find them.

2 = Few, usually more than 5 lesions, no appreciable percentage of foliage dead.

3 = Moderate, up to 50% foliage dead.

4 = Severe, 50-90% foliage dead

5 = Dead.

(A 2+ means plant intermediate between 2 and 3)

(A 3+ " " " " 3 and 4)

(A 4+ " " " " 4 and 5)

Type of lesion produced was read as follows:

+ - Slow-spreading, resistant-type; often turns necrotic, and ceases to sporulate; often has definite yellow halo about lesion.

++ - Lesion sporulates more readily, intermediate in growth rate between + and +++.

+++ - Lesion spreads rapidly and sporulates profusely; susceptible-type lesion.

Sometimes readings were different for lower and upper leaves on same plant. In this case the letters (L) and (U) were affixed to the reading.

1/ Plant Pathologist, Rockefeller Foundation, Mexico, D. F.

Where the severity of attack was 3 or more, there was no point in qualifying the type of lesion since it was invariably a +++.

Examples of readings:

- (1) +++ (L)-1 Very few lesions, of completely susceptible type, only on lower leaves.
- (2) { + (U)-1 Very few lesions, resistant-type, on upper leaves;
 { +++ (L)-2 few lesions on lower leaves; lesions susceptible type, with little or no dead foliage.

Late blight was first observed in the plot on June 29 on check plants. The disease progressed slowly, compared with the 1952 epidemic. Following are the general observations made as the season progressed:

- June 29 : First blight lesions observed on check plants. None observed on seedlings.
- July 8-13 : Scattered lesions throughout the check plants. 89 seedlings were blighted, usually only a few lesions per plant and on the lower leaves. Some clones obviously more susceptible (US-59, all attacked).
- July 18 : All checks infected, severity 2-5. Blight prevalent on seedlings (0-4), with only a few that still have 0 reading. Most are 1 or 2.
- July 28-30: Checks mostly dead. Almost all seedlings with +++ reading, severity 1-5, mostly 2-3.
- Aug. 7-12 : Checks completely dead. Seedlings mostly dying or dead from blight. Some seedlings still show good resistance.
- Aug. 18-20 : Last reading. Following is classification of seedlings according to blight reading:

<u>Blight reading</u>	<u>No. seedlings</u>	<u>Percent</u>
0	0	0
1	1	0.03
2	10	0.28
2+	15	0.42
3	52	1.46
3+	120	3.40
4	208	5.89
4+	391	11.06
5	2738	77.46
Total	3535	100.00

It was decided to keep for further study and possible crossing all seedlings that showed a reading of 1 to 3+. Those which had a 4 were kept, if the yield was good, for studies on the production of these seedlings with the help of 1 or 2 sprays. All plants with 4+ or 5 were discarded.

Summary of Late Blight Readings

Our No.	U.S.D.A. No.	Pedigree	Blight Reading (Aug. 18-20)							
			1	2	2+	3	3+	4	4+	5
19	B 3491	GLB-1 x Teton				1				
20	B 3492	" x B 929-32						1	4	5
21	B 3493	" x Katahdin					1		1	4
22	B 3495	B 922-6 x B 2968-31						1	10	61
23	B 3496	" x B 929-32						1	7	72
24	B 3497	" x Teton						2	1	15
25	B 3499	B 922-6 x "						2	1	16
26	B 3500	B 922-10 x B 929-32				1	1	1	2	17
27	B 3501	B 922-10 x Teton							1	8
28	B 3502	B 922-18 x B 929-32				3	1	2	12	50
29	B 3503	" x Saranac							1	
30	B 3504	" x Teton					6	7	23	83
31	B 3505	3 NC-9 x B 929-32								11
32	B 3506	" x B 922-3				3	4	6	21	55
33	B 3507	3 XE-1 x "						2	2	1
34	B 3508	3 XE-1 x B 929-32					1		2	266
35	B 3509	HIS-2 x "								1
36	B 3510	" x Saranac					4		2	1
37	B 3511	Ac 25949 x Katahdin					2	12	20	181
38	B 3512	" x B 922-3			2	3	2	6	7	29
39	B 3513	Ac 25956 x Katahdin								6
40	B 3514	" x B 922-3	1				4	4	8	30
41	B 3515	HIM-1 x Saranac							1	22
42	B 3516	Ac 25891 x 528-170				2	7	29	36	97
43	B 3517	Ac 25828 x B 929-32							8	43
44	B 3518	Ac 25832 x "			1	1	4	12	42	202
45	B 3519	Ac 25955 x Katahdin				2	5	13	8	219
46	B 3520	Ac 25960 x B 929-32					1	2	5	200
47	B 3521	Ac 25960 x Katahdin					1	5		118
48	B 3522	Ac 25962 x B 929-32					1	2	4	27
49	B 3523	Ac 25962 x Katahdin						1		12
50	B 3524	Ac 25963 x B 929-32					1	2	2	5
51	B 3525	Gr. Mt. x HLT-4								24
52	B 3526	96-56 x "								69
53	B 3527	HLT-6 x Katahdin					1		2	4
54	B 3528	" x B 2395-14								3
55	B 3529	B 595-76 x B 922-3					3	1	3	30
56	B 3530	Kennebec x "						2	4	15
57	B 3532	Ac 25904 x B 607-56					5	9	4	76
58	B 3533	Ac 25904 x B 922-3							3	10
59	B 3534	Ac 25901 x B 936-12								7

Our No.	U.S.D.A. No.	Blight Reading (Aug. 18-20)										
		1	2	2+	3	3+	4	4+	5			
60	B 3535	Ac 25897	x	Teton		2			1			
61	B 3537	HLT-4	x	Saranac		1	4	2	68			
62	B 3538	"	x	Katahdin					10			
63	B 3539	B 936-12	x	B 922-3					5			
64	B 3545	Ac25821-4	x	President					1			
65	B 3546	HJA-2	x	Katahdin			1	1	26			
66	B 3547	HLA-1	x	B 929-32	1	2	2	8	45			
67	B 3548	3 VW-9	x	B 2968-31	3	6	7	26	53			
68	B 3549	GLB-1	x	HLT-4					2			
69	B 3550	S.demisum	x	B 983-9	6	3	2		1			
70	B 3551	(S.demisum	x	B 24-76)			2		3			
			x	B 983-9								
71	B 3552	(S.demisum	x	S.andigenum					2			
		EPC 140.3)	x	B 983-9)								
72	B 3553	S.demisum	x	B 872-70	-	-	-	-	-			
73	B 3554	(S.demisum	x	S.andigenum				1				
		EPC 140.3)	x	B 778-43								
74	B 3555	(S.demisum	x	B 24-76)		1	4	1	2	4	11	
			x	B 778-43								
75	B 1401	B 922-3	@				2	2	6	3		
76	B 1402	B 922-6	@						1	30		
77	B 1403	Ac 25949	@		1	2	8	9	32	27	115	
78	B 1404	Ac 25891	@			1		8	13	10	48	
79	B 1405	Ac 25892	@								1	
80	B 1406	Ac 25895	@					1			1	
81	B 1407	Ac 25901	@					1		1	1	
82	B 1408	Ac 25904	@				1	1	2	2	58	
83	B 1410	Ac 25919	@			1						
84	B 1412	Ac 25962	@			1	1	1		1	2	
85	B 1414	Ac 25953	@		2	3	14	24	7	23	29	
86	B 1415	Ac 25954	@							1	1	
87	B 1416	Ac 25955	@		1				4	16	70	
88	B 1417	Ac 25956	@		1						1	
89	B 1418	3 VW-9	@				1	2	7	14	55	
Total # 3535					1	10	15	52	120	208	391	2738

Notes and Summary

1. No seedling in this test was immune to P. infestans at Toluca in 1952. A wide range in resistance was observed in the 3779 seedlings planted.
2. The following appeared to be good sources of minor genes for resistance: B 922-3, Ac 25953, and Ac 25949. Others that appeared to be fair sources were: B 929-32, Ac 25891, Ac 25962, and 3 VW-9.
3. The most promising families of seedlings from the standpoint of blight resistance and commercial characteristics were: B 3512 (Ac 25949 x B 922-3) B 3516 (Ac 25891 x 528-170)
4. Some families of seedlings from self pollinations were generally bad in tuber shape and characters, though highly resistant to foliage blight. B 1403 (Ac 25949 @) had a high percentage of off-shape, elongated, and fusiform-shaped tubers. B 1414 (Ac 25953 @) gave a high percentage of seedlings with tubers that had severe cracks and deep furrows at the seed end of the tuber, which we called "cat-face".
5. In October it was noted that the tubers of some selections harvested had a severe net necrosis. A systematic examination was made of the tubers of all selections, and as a result many had to be discarded. The source and cause of this net necrosis have not been determined.
6. The results of the 1953 Toluca trials indicate that high levels of partial resistance can be incorporated in commercially acceptable potatoes. This partial resistance apparently comes from the so-called "minor genes". Certain parents tend to give a much higher percentage of resistant progeny. Some individual seedlings were found to have much more resistance than either of the parents.

NIGERIA, WEST AFRICA

T. A. Russell

You may be interested in the very promising results we have had so far with the blight-resistant potatoes sent us earlier in the year for trial in the high country of the Cameroons.

These were planted within a field of the local susceptible variety. About 10 weeks after planting the local potato was blackened and destroyed by blight, whereas most of the American kinds were green and flourishing and untouched by disease. An interesting exception was Chenango from Cornell which had gone down as badly as the local.

A disease assessment made 10 weeks after planting follows. We would like to express our thanks to your Department for the help given in this matter, which has given such encouraging results to date.

Potato blight assessment: Bambui Government Farm, Cameroons, June 16, 1953.

Seed source	Variety	Date planted	Disease assessment
			Percent
Local	Smooth Skin	March 26	95.0
Scottish Plt. Breeding Station	1521c (3)	"	1.0
	1521d (24)	"	1.0
	1522c (11)	"	.1
	1564a (14)	"	1.0
	1565 (4)	"	.1
	1664a (12)	"	5.0
	1668b (7)	"	5.0
	1928e (2)	"	.1
Div. of Veg. Crops, USDA	Cherokee	April 8	.1
	Kennebec	"	.0
	Pungo	"	.0
	B 73-10	"	.0
	B 73-18	"	.1
	B 922-3	"	25.0
	B 922-6	"	.1
Cornell University, N.Y.	Placid	"	.0
	Chenango	"	95.0
Dominion Horticulturist, Canada	Canso	April 23	.0
	Keswick	"	.0
Local	Smooth Skin	April 8	50.0

Key to disease assessments:

- 0 : Not seen
- 0.1 percent : A few spots on 1 or 2 plants only.
- 1 : Up to 10 spots per plant.
- 5 : Up to 50 spots per plant or 1 leaflet in 10 attacked.
- 25 : Every plant with spots. Plants retaining their usual form; plot still looks green.
- 50 : Every plant affected and about one-half of leaf area destroyed by blight; plot green flecked with brown.
- 75 : About three-fourths of leaf area destroyed by blight; field neither predominantly green nor brown.
- 95 : Only a few leaves left green; stems green.
- 100 : All leaves dead; stems dead or dying.

